

# **AN ANNOTATED BIBLIOGRAPHY OF NUTRITION RESEARCH IN MALAYSIA: SUPPLEMENT (1979-1984)**

annotated and compiled by  
**TEE E SIONG**



## **ASEAN PROTEIN PROJECT**

National Sub-Committee Malaysia

**AN ANNOTATED BIBLIOGRAPHY  
OF  
NUTRITION RESEARCH IN MALAYSIA:  
SUPPLEMENT (1979–1984)**

Annotated and Compiled

by

TEE E SIONG

ASEAN Protein Project  
National Sub-Committee Malaysia  
1984

ISBN 967-99909-2-3

© Copyright ASEAN Sub-Committee on Protein 1984

Printed by Penerbitan Adabi Sdn. Bhd., Kuala Lumpur.

## CONTENTS

PREFACE	vii
ABSTRACTS	
FOOD AND NUTRITION IN MALAYSIA	3
NUTRITION SURVEYS	
GENERAL	13
ANTHROPOMETRIC	23
BIOCHEMICAL	25
DIETARY	26
NUTRITIONAL ANAEMIA	30
VITAMIN A DEFICIENCY	32
PROTEIN-CALORIE MALNUTRITION	33
OTHER NUTRITIONAL DEFICIENCY DISEASES	34
NUTRITION AND DENTAL HEALTH	39
OVERNUTRITION AND ASSOCIATED DISORDERS	40
NUTRIENTS IN FOODS	41
TOXICANTS IN FOODS	82
SOCIO-CULTURAL ASPECTS OF FOOD AND NUTRITION	96
DIETS AND DIETARY REQUIREMENTS	115
NUTRITION INTERVENTION PROGRAMMES	118
SUBJECT INDEX	131
AUTHORS INDEX	142



## PREFACE

This Supplement to An Annotated Bibliography of Nutrition Research in Malaysia (1979–1984) serves as a sequel to a previous publication of 1980 on the same subject. The latter which contained 526 abstracts of publications and reports on nutrition research in the country over the period 1900 to mid-1979 was well received. Most users found it a convenient and useful guide in identifying and utilising research papers related to their own interests. It also helped to present to the new research worker to a particular field the research activities for that area in a nutshell. The encouraging response provided the impetus for the present follow-up compilation.

The format of the original compilation has been retained in this supplement. Thus, under each broad category or subject, the publications are arranged in chronological order. For papers published in the same year, they are arranged according to the alphabetical order of the author(s). The subject index and author index at the end of the compilation give the abstract number(s) where the particular publication(s) could be located. These indexes refer only to publications contained in this supplement.

A total of 322 publications and their abstracts are included in this supplement, bringing the total number of abstracts to 848. It will be noted that some of the papers (69 of them) included in this supplement are publications prior to 1979 which have been missed earlier.

The preparation of this supplement has been greatly aided by the use of a home word-processing and filing system in a micro-computer. The former has been particularly useful in the preparation of the abstracts of the publications, and the filing system has greatly eased the preparation of the author and subject index. This little note has been added in view of the impending large-scale usage of computers in the country.

The author thanks Dr Y.H. Chong, Head of the Division of Human Nutrition for his continued interest and support in this work, and Dr T.W. Lim, Director of the Institute for Medical Research for his permission to publish this supplement. Sincere thanks also go to Dr A. Zaharudin Idrus, Chairman of the National ASEAN Sub-Committee on Protein, for his interest and encouragement in the compilation. As with the first publication, the ASEAN Sub-Committee on Protein has again financed the cost of publishing this supplement, for which the author is deeply grateful.

Tee E Siong  
Nutrition Officer  
Division of Human Nutrition  
Institute for Medical Research  
Kuala Lumpur, Malaysia.

July 1984.



## ABSTRACTS





## FOOD AND NUTRITION IN MALAYSIA

### 527. ANUWAR MAHMUD

#### Food problems in Malaysia

*Proceedings of the Seminar on Food Problems in Asia and the Pacific, May 1970, East-West Center, Hawaii; pp. 188–207*

A little background on the agricultural pattern of the country was first given. It was pointed out that only a small portion of the total cultivated area was used for food crop production. The country was thus lacking even in the staple food, rice. Foods from other sources such as legumes and livestock were also insufficiently produced locally. The problems of food production were discussed, emphasizing on the protein gap problem. Data on food consumption from various studies and estimates in the country were presented and discussed. Various measures were suggested to solve the protein food problem, including research to improve the quantity and quality of existing plants and livestock and lowering the cost of production of livestock, credit facilities or subsidies to improve and encourage crop and animal production, as well as to ensure an efficient marketing and distribution system for food commodities.

### 528. KASSIM ISMAIL

#### The status and availability of proteins in Malaysia

*Country Statement delivered at the Meeting of ASEAN Experts on Protein Rich Foods, 27–30 November, 1972, Kuala Lumpur; 11 p. (mimeographed).*

Protein malnutrition is the main feature of the technologically less advanced countries where intake of the quantity and quality of proteins is below the body requirements. Protein deficiency can have serious consequences on the health and the working efficiency of the population. The paper reviewed the status and availability of protein sources in Malaysia. Supplies from vegetable, animal, fish and non-conventional proteins (e.g. single-cell and leaf proteins) were discussed. Per capita protein availability for different regions of the world were compared with that calculated for Malaysia. The situation in the country did not appear to be serious. It was however emphasized that per capita data are by means sufficient reflections of the true national situation in the rural areas. Several recommendations to solve the protein problems were made.

### 529. N. CHANDRASEKHARAN

#### Nutrition and infection

*The Family Practitioner, 1(4):2–4, 1974*

The role of nutrition in protecting the body against invasion by infecting organisms may be evidenced from alterations to tissue integrity and mucous secretions, both of which are necessary for protection, in dietary deficiencies. Once the infecting agent has entered the body, it encounters the two major defence mechanisms for resisting infection, namely phagocytosis and antibody formation. Nutritional deficiencies can reduce both the number and phagocytic capacity of cells, as well as interfere with

antibody formation. Infectious diseases can adversely influence the nutritional status in a variety of ways, both direct and indirect. The paper reviewed briefly the above inter-relationships between nutrition and infection.

**530. M.J. ROBINSON and E.L. LEE (editors)**

**Paediatric problems in tropical countries**

*Churchill Livingstone, 1978; 349 p.*

The book was said to have been written for the undergraduate medical student, the paediatric resident medical officer and for those doctors concerned with primary child health care in tropical countries. Contributors to the book were academic members of the Department of Paediatrics, University Hospital, University of Malaya, Kuala Lumpur. Some aspects on nutrition were included, such as on infant feeding practices, growth, and a chapter on iron deficiency anaemia in infancy.

**531. T. CHELLIAH**

**Nutrition and the child**

*Report of the Seminar on Health, Food and Nutrition, 15–20 September 1979, Penang; 24 p. (mimeographed)*

The Paper is concerned with the form of malnutrition wherein food intake is high in quantity but almost totally lacking in quality. In this instance, hunger is satisfied, but the food consumed is deficient in the essentials required for the maintenance of proper health and normal activity. Three fundamental and practical problem areas were discussed, namely misconceptions related to the dietary needs of mother and child, some prevalent incorrect value systems regarding nutrition, and difficulties of an economic characteristic that augment then problem. Some of the dietary misconceptions discussed were those that relate to proper maternal nutrition, infant feeding practices and the nutritional needs of toddlers and school children. Some of the traditional values that have been attached to the concept of nutrition are said to be the cause of some of the malnutrition in the country. Examples of some of such incorrect beliefs relate to the choice of highly-milled rice, food preparation, a number of food taboos, and breast feeding. The third problem area discussed relate to the prevailing high cost of food in relation to the general levels of income in the rural and urban sectors.

**532. FATIMAH ARSHAD**

**Nutrition during pregnancy and lactation**

*Report of the Seminar on Health, Food and Nutrition, 15–20 September 1979, Penang; 7 p. (mimeographed)*

Although genetic factors are said to determine the potential characteristics of a human being, factors like economic status, parity, nutrition and health of the mother both during pregnancy and lactation are also important contributory factors that determine the well being of the infant. The paper reviewed briefly the important nutritional fac-

tors for pregnant and lactating mothers. Recommended food and nutritional requirements were the main emphasis of the paper.

### **533. REBECCA GEORGE**

#### **Nutritional problems in Malaysia – urban and rural**

*Report of the Seminar on Health, Food and Nutrition, 15–20 September 1979, Penang; 19 p. (mimeographed)*

The major part of the paper presented data on 70 cases of severe protein-energy malnutrition admitted to the Paediatric Unit of the General Hospital, Kuala Lumpur from January 1978 to August 1979. Most of these cases were Indians, and coming from within 5 miles radius of the city. Data on clinical, anthropometric and nutritional biochemistry of these children were presented and discussed. The other problems seen in the urban children were overnutrition, and incorrect and overfeeding of infants. Various studies carried out by other investigators for the rural areas were also reviewed. The major nutritional deficiencies encountered were discussed. The application of ANP-like programmes in the urban slum areas, and the starting of an "at risk" register for cases of severe PEM and their long term follow up could help to reduce the problem. These could also prevent the bad consequences of poor nutrition, including intellectual development and increased risk of infection.

### **534. ISMAIL MUHD. SALLEH and PAUL CHAN**

#### **Nutrition, poverty and food crop policy in Malaysia**

*Report of the Seminar on Health, Food and Nutrition, 15–20 September 1979, Penang; 40 p. (mimeographed)*

The paper was aimed at affirming the significance of malnutrition as a component of the poverty problem, and describing the food crop policy of the Malaysian Government in this context. In the past, the problems of poverty in the country have been analyzed and discussed primarily in terms of incomes that the family received. Little attention was given to the other dimensions of poverty such as nutritional, educational and health needs, which are fundamental and should deserve greater attention. Since expenditures on food constitutes a major portion of household expenditure among the low income and rural households, considerations of this should be given in the design and formulation of policies on food crop production. A national food policy should give greater attention not only to the problem of production, distribution and consumption, but also to ensure that they are readily available to the poor in order to meet their basic calorie intake at reasonable prices. It was suggested that the government should seriously consider subsidizing prices of some of the food items for the low income and nutritionally deprived groups.

### **535. KHAIRUDDIN YUSOF and ZINAL AZNAM YUSOF**

#### **Economic aspects of health and human development**

*Southeast Asian Medical Information Center (SEAMIC) Publication No.15, Tokyo, 1979; 154 p., 2 volumes*

This monograph, said to be a follow-up of a previous publication by these authors (abstract no. 462), was divided into two parts: volume I looked at the economic

aspects of health, while volume II examined foetal human growth and development. Chapter one of volume I provided some insights into the nature of external economies and diseconomies and of public goods and their subtypes. The second chapter in this volume looked at a selected number of topics: the characteristics of the health and medical care industry, health as investment in human capital, and the economic implications, including costs, of the control and eradication of certain diseases. The last chapter of the first volume dealt with the development of the health sector in Malaysia. Normal foetal growth and development was examined in the first chapter of volume II, while the factors which influence normal foetal growth were taken up in the following chapter. The abnormal aspects of growth and development were then discussed in the last and concluding chapter. Several important general conclusions were reached: (1) early intrauterine human growth and development is highly complex; (2) nutrition played a crucial role during the critical phases of human growth; (3) marked differences were observed between the races and within each race in foetal growth and development. The report had emphasized on the differences between the three major races, and between social classes. A total of 184 references were included at the end of volume II of the monograph.

### 536. G.L. KHOR

#### Malnutrition and mental development

In: *For the Well-Being of Malaysian Children*, edited by Eleonora Sanders, Mary Tan and Zaitun Yassin; Universiti Pertanian Malaysia, 1979; pp. 28–35

It is only recently that systematic attention has been directed to the possible causal effects that malnutrition in early life may have on intellectual functioning and learning abilities in later life. Findings from several epidemiological surveys of human population carried out in some countries, as well as studies on experimental animals were briefly reviewed; Most studies have shown that severe malnutrition inflicted prenatally and in the first 2 years of life, especially during the first 6 months, would impart a more permanent damage than if it occurs at an older age. However, in view of the difficult methodological problems encountered with human studies and the multifarious causal factors involved, more work is needed to unravel the roles played by such factors as hospitalization, social stimulation, maternal health and nutrition during pregnancy, birth damage and infection, in order to have a clearer understanding of the implications malnutrition have on the mental development of the child.

### 537. NAFSIAH OMAR

#### Nutritional needs and status of Malaysian children

In: *For the Well-Being of Malaysian Children*, edited by Eleonora Sanders, Mary Tan and Zaitun Yassin; Universiti Pertanian Malaysia, 1979; pp. 7–27

The nutrient requirements of Malaysian children and pregnant women were first briefly dealt with in the paper. The greater portion of the paper discussed the nutritional status of communities in the country. Studies were cited to illustrate the prevalence of various nutritional problems, emphasising on protein-calorie malnutrition, anaemia, vitamin A deficiency and goitre. The many contributing factors to the problem, ranging from unequal distribution of food, poverty, ignorance of food values and

physiological needs, and poor food habits, to intestinal and parasitic infections, were also discussed.

### **538. ONG HEAN TEE**

#### **Health problems of the Orang Asli of Malaysia**

*Report of the Seminar on Health, Food and Nutrition, 15–20 September 1979, Penang; 7 p. (mimeographed)*

The health and nutritional pattern of the Orang Asli was observed to vary with their ethnic grouping and geographical habitat. With regard to nutritional problems, these were commonest in the fringe jungle group. Diet of these people was seen to be poor and fish and meat had to be bought since they seldom had enough land for food crop. Their earned income was often spent on tobacco, sweets and cakes. The available medical services for the Orang Asli were reviewed, and the problems encountered in running these services discussed. Suggestions were made to improve these services.

### **539. S.T. CHEN**

#### **Physical health problems and needs of the child**

*Journal of the Malaysian Society of Health, 1(1) : 7–11, 1980*

The major health problems faced by children in developing countries are high mortality and morbidity. In 1975, the infant mortality rate in Malaysia was 30 which was twice as high as that of USA and the toddler mortality rate was 3 which was 4 times as high as that of USA. The paper discussed the major causes of death in children in these countries, namely diarrhoeal diseases, pneumonia and other infectious diseases. Malnutrition, though not listed as a leading cause of death, was also a major problem amongst these children. The author emphasized that these major causes of mortality and morbidity were largely preventable. The leading causes of death during infancy were next discussed. The paper also touched on the problems faced by the handicapped children in the country.

### **540. Y.H. CHONG**

#### **Malnutrition, food needs and prospects for supplies**

*Journal of the Malaysian Society of Health, 1(1): 12–19, 1980*

Nutritional well-being is dependent on the availability of food which in turn must depend on food production, the various factors that affect food production and its distribution. The paper focused attention on the need to consider agricultural productivity in relation to nutritional problems. The twin faces of malnutrition in the country were first discussed. Amongst the disadvantaged poor, be they in the rural inland areas or the cities, protein-energy malnutrition whether in its severe or moderate forms, was said to be still rampant. In marked contrast, obesity and hyperlipidemia are increasingly common amongst the more affluent city dwellers. The author next discussed current trends in population growth and food production, food availability and food demand. Reviewing the trends in food production and population growth in the country from 1960–1975, it was pointed out that the production of

major food commodities seemed to have outstripped population growth estimated at 2.6% per annum for the corresponding period. Estimates of food availability in 1975 showed that food energy may be marginal in certain sectors. Protein availability however appeared to have exceeded requirements by a considerable percentage. The projected demand for the major food items in 1990 was tabulated. To meet this demand, various measures to increase food productivity and availability were suggested. The prospects for the required increased food production was examined. Considering all evidences presented, it was felt that the prospects for feeding Malaysia's growing population was bright.

#### 541. Y.H. CHONG

Nutrition and related indicators in a rapidly developing economy : some pointers from Malaysia.

*Proceedings of the Third Asian Congress of Nutrition, 6–10 October 1980, Jakarta;* edited by Didin S. Sastrapradja, Soenartono Adisoemarto and Setijati Sastrapradja; pp. 547–560

Various cross-sectional nutritional surveys conducted in the rural and urban areas of Peninsular Malaysia during the past decade indicate that the triad, viz., protein-calorie malnutrition (growth retardation), vitamin A deficiency and iron deficiency anaemia remain the major nutritional problems of the pre-school and primary school population. Evidences for the existence of malnutrition amongst pre-school children were presented in the paper in the form of several tables and figures. Indirect and direct indicators of change, as well as the findings of a ten-year-follow up study of McKay (abstract no. 558) were next put forth to indicate an improving nutrition situation. Extrapolating from the prevalence data presented, the number of malnourished pre-school, primary school children, and pregnant and lactating women from the rural and disadvantaged urban sectors in Peninsular Malaysia has been quantitated (see abstract no. 554). It was estimated that about 3/4 millions of the these vulnerable groups may be in need of assistance for supplementary foods, and that \$25 million would be required annually for the purpose.

#### 542. Y.H. CHONG

Nutrition and athletic performance

*Paper presented at the Seminar on Sports Medicine, November 1980, Kuala Lumpur;* 9 p. (mimeographed)

Aside from innate ability and training, athletic performance also depends on energy source for muscular contraction which is diet dependent and can be nutritionally conditioned. The paper outlined the chemistry of muscular contraction, and explained the importance of glycogen stores during high intensity exercise of long duration, especially at the end of the competition when an intensive spurt may be decisive for winning the race. In recent years, it has been found that muscle glycogen stores can be greatly increased when a high-carbohydrate diet is introduced during the week preceding competition. Increasing the muscle glycogen stores upgrades performance by increasing anaerobic energy production. A dietary regime to improve muscle glycogen store in endurance events was outlined. Some advice on meal times on the day of competition were given. Some common myths regarding diets and nutrition and athletic performance were also discussed.

### Role of government agencies and food industries in the development of food technology – a consumer's view

*Proceedings of the International Symposium on Food Technology in Developing Countries, 3–5 September 1980, Kuala Lumpur; edited by S.K. Berry, Mohd. Ismail Abd. Karim and Asiah Mod. Zain; pp. 402–412*

The type of food which people consume is a major determinant of the state of their health. While wholesome natural foods can boost an individual's vitality and health, many products of modern food technology have negative effects on consumers' safety and health. It is now well known that many modern processed foods contain undesirable additives and chemicals, while many fast foods have low nutritional value. In developing countries, the potential dangers of modern food products are even greater. In general, regulations governing food safety are few and weakly enforced. At the same time, foods of low nutritional value are now flooding the markets of these poor countries, diverting people with already little resources away from consuming foods of higher nutritional value. As a result, many health problems such as cancer, high blood pressure and food poisoning have increased, while economically much money has been wrongly channelled into poor nutrition choices. Looking at this situation, government agencies in developing countries should play a strong role in curbing the use of undesirable chemicals in foods, discourage the consumption of nutritionally poor foods and encourage the consumption of good, wholesome, natural foods. The food technologists also have a role to play in pledging themselves to producing only foods which will result in better nutrition and health of the consumers.

### 544. FREDA VERGHESE

*Kesihatan kanak-kanak sebelum bersekolah dan yang sudah bersekolah (Health of the pre-school and the school child)\**

*Proceedings of the Seminar on Supplementary Feeding Programme in Malaysia, 16–17 January 1980, Kuala Lumpur; pp. 27–34.*

The paper reviewed the School Health Service and the health of the pre-school and school child in the State of Melaka. There being no special health service for the pre-school child, health personnel had to visit kindergartens run by KEMAS and some of the private ones. The number of such centres covered in 1979 and the common conditions treated or referred for were tabulated. Similar tables for the rural primary schools (covered by the Ministry of Health) and the urban schools (by the Municipality) for the year 1978 were presented. Comments were made on the tables presented. The author pointed out and discussed the seemingly few cases of anaemia and under-nutrition amongst the pre-schools and the rural schools whilst the percentage reported for the urban schools was very much higher. Some of the problems faced in attempting to provide good school health services were pointed out, including some of the inadequacies in the School Supplementary Feeding Programme.

\* In both English and Bahasa Malaysia



**545. M. PARAMESHVARA DEVA**

**Aspects of nutrition and child development in Malaysia**

*Journal of the Psychiatric Association of Thailand*, 26(3):27–30, 1981

Among the numerous factors affecting the health of the child and thereby that of the community and country, the one of perhaps greatest importance in today's developing world is that of nutrition. The paper discussed briefly the various nutritional problems of children in Malaysia and the intervention programmes implemented to combat malnutrition, especially the Applied Food and Nutrition Programme.

**546. KHOR GEOK LIN**

**Nutritional status of Malaysians**

*Paper presented at the Symposium on Amino Acids and Nutrition, 31 December 1981, Kuala Lumpur; 13 p. (mimeographed)*

The paper first briefly reviewed the various tools that may be used for the nutritional assessment of communities. Through a combination of anthropometric, biochemical, clinical and ecological studies, the complex interactions between environmental and social factors and the individuals in a community could be studied. Various studies carried out in the country were next reviewed, to present evidences of nutritional problems, emphasising on protein-calorie malnutrition, vitamin A deficiency and nutritional anaemia.

**547. W.P. BUTZ, J. DAVANZO and J.P. HABICHT**

**Biological and behavioral influences on the mortality of Malaysian infants.**

*Rand Corporation Publications, N-1638-AID, 1982; 76 p.*

Infant mortality is widely used as a summary measure of socioeconomic development and well-being. This study examined the determinants of infant mortality variations in Peninsular Malaysia. It considered biological correlates of mortality as well as family characteristics and behaviour. Included were most of the influences commonly cited as affecting infant mortality: maternal education, socioeconomic class, age, birthspacing, and prior reproductive loss; availability of health services; and infant's sex, breastfeeding and type of weaning food, birthweight, and birth order. It assessed how these influences and interactions change in importance through successive subperiods of the first year of an infant's life. Those characteristic that are most conducive or detrimental to infant survival were identified. Data for these analyses were obtained from the 1976–1977 Malaysian Family Life Survey (MFLS) (abstract no. 555). The data were primarily retrospective, largely drawn from subject-reported questionnaires. This report concluded with a discussion of the implications of the findings for future research, risk screening and targeting of interventions, and for programme and policy initiatives.

**548. CHEE HENG LENG**

**Health status and the development of health services in a colonial state: the case of British Malaya**

*International Journal of Health Services*, 12(3): 397–417, 1982

The health of a population and the development of health services in a country at a particular time in history are directly linked to the socioeconomic system. This paper discussed health and health services in the Malay Peninsula during the time that it was a British colony. Economic production under British colonialism, which was basically a capitalist system, was organized primarily for the purpose of realizing profits. The health of the population was in direct conflict with and generally subordinated to this main objective. The pattern of health that emerged reflected this general framework. Various infectious diseases and diseases of the gastrointestinal tract were rampant. Nutritional deficiency and respiratory diseases, diseases related to bad living conditions and poverty were equally widespread. These include beri-beri, protein-calorie malnutrition, anaemia, vitamin A deficiency, diarrhoea and enteritis, tuberculosis, diphtheria, and pneumonia. Health services were developed under the colonialist system, but they were developed primarily to serve the economic interests of the colonialists. Hence the structure of health services was biased towards curative medicine and centered mainly in the urban areas.

**549. Y.H. CHONG**

**Population and social indicators of food and nutrition in Peninsular Malaysia**

*The Medical Journal of Malaysia*, 37(2) : 134–140, 1982

The paper presented and discussed recent trends in population indicators that relate to food, nutrition and nutritionally-related health situation in Malaysia. Changes in toddler mortality rates from 1957–1978, incidence of low birthweight for 1978 and recent trends in food pattern and availability were presented. Results of some recent direct assessment of community nutritional status were next reviewed. While the indirect population indicators suggested an improving nutritional situation, methods of direct assessment had shown that chronic protein-energy malnutrition and anaemia were still common amongst pre-school children in both the rural and urban disadvantaged sectors. Moderate anaemia also affected a significant proportion of older children and women of child-bearing age. In striking contrast, evidences were presented to show that diseases associated with dietary excesses and increasing affluence had emerged as the major killers in the country. The author emphasized the need for continued efforts to improve the nutritional health of the rural and urban poverty communities as well as to stem the rising number of deaths associated with our increasing affluence.

**550. MIRNALINI KANDIAH**

**A review of the nutritional status of the Indian community in Peninsular Malaysia**

*The Family Practitioner*, 5(3):39–43, 1982

The paper reviewed recent findings on the nutritional status of the Indian community so as to highlights the major problems faced by this community. The decline of todd-

ler mortality rate over the years was said to be the least satisfactory amongst the Indians, incidence of infants born with low birthweights and perinatal mortality rate were found to be the highest amongst this ethnic group. Available scanty information on nutrition surveys of Indian communities showed a high prevalence of protein-energy malnutrition, anaemia, vitamin A deficiency, thiamine and riboflavin deficiencies and helminthic infestations. The various contributory causes to the problem of malnutrition amongst the Indians were discussed. The author drew attention to the severity of the problem and called for urgent recognition and remedial measures from both public health and political sectors alike.

#### **551. TAN LOONG—HOE**

**Malnutrition, health resources and education in Peninsular Malaysia.**

*Institute of Southeast Asian Studies Occasional Paper no. 69, Maruzen Asia, Singapore, 1982; 118 p.*

The book is divided into four chapters. In the first chapter, the author introduced the study by drawing attention to the severity of the problem of malnutrition, and the emphasis that the Malaysian Government has placed in tackling the problem. The second and largest chapter presented various data, both indirect and direct indicators of nutritional status, in an attempt to present a comprehensive assessment of the malnutrition situation in the country. The complexity and multiplicity of causes of malnutrition was discussed, with particular reference to the rural Malay communities. The third chapter attempted to elucidate the traditional Malay medical health system and examined the existing modern medical health care system. An alternative health care system which was thought to be more responsive, with respect to the criteria of access and acceptability, to the rural Malay population was proposed. Within the framework of the proposed alternative system and its recommendation, the next chapter discussed the implications for nutrition education with reference to the planning and programming at the micro-community level. In the concluding chapter, the question of how effective and to what extent nutrition education could contribute to overcoming the complex malnutrition problems amongst the rural Malays was discussed.

#### **552. TEH KANG HAI**

**Tradition and medicine in Malaysia: a bibliography**

*University of Malaya Library, Kuala Lumpur, 1983; 47 p.*

Traditional medical practices, beliefs and attitudes relating to health, diseases, nutrition and related subjects, are still very prevalent among the various races in Malaysia. Since the earlier part of this century, Malaysian traditional medicine, and in particular Malay traditional medicine, had evoked much interest mainly among foreigners, based on accounts recorded in various publications. The present bibliography was compiled with the aim of providing a convenient source of reference on traditional medicine in the country, as well as to give prospective new scholars to this field, a better perspective of the scope and potential available for further study and research. The compilation contains 587 references on popular folk beliefs, superstitions and indigenous practices pertaining to health, diseases, nutrition and related medical subjects.

### 553. REBECCA GEORGE

#### Nutritional disorders in Southeast Asia: Viewpoint from Malaysia

*Medical Progress*, pp. 13–17, May 1984

This review discussed the nutritional problems in 4 Southeast Asian countries, namely Indonesia, the Philippines, Thailand, and in particular, Malaysia. Emphasis was placed on protein-energy malnutrition, iron deficiency anaemia, vitamin A deficiency, thiamin deficiency and endemic goitre.

### 554. Y.H. CHONG

#### Current nutrition situation and its quantification in Peninsular Malaysia

In: *Nutrition and Food Habits in ASEAN* (in press)

Several indirect and direct indicators to define the status of nutrition in Peninsular Malaysia were discussed. In the first group of indicators were toddler mortality rate, birth weight, and recent trends in food pattern and availability. Results of several cross-sectional nutrition surveys to directly assess the nutritional status of various population groups were next examined. The main nutritional problems were identified as protein-calorie malnutrition, vitamin A deficiency and iron deficiency anaemia, the latter of which may be aggravated by the ubiquity of soil-transmitted helminthic infestations. The crude prevalence rates for moderate protein-calorie malnutrition for rural pre-school and primary school children were estimated to be approximately 38% and 35% respectively. For pregnant and lactating women, the percentages of those chronically malnourished were calculated to be 28% for Indians, 12% for Malays and 6% for Chinese. Based on these rates, it was calculated that about 3/4 million persons were at risk nutritionally. Such quantification of the nutrition problem is thought to enable public health nutritionists, planners and economists to have a better focus on the size of malnutrition in the country.

## NUTRITION SURVEYS:—

### GENERAL

### 555. W.P. BUTZ and J. DAVANZO

#### The Malaysian Family Life Survey : summary report

*Rand Corporation Publications R-2351-AID*, 1978; 22 p.

The Malaysian Family Life Survey (MFLS) was designed and fielded by Rand Corporation, in collaboration with the Government Department of Statistics in Malaysia and with Survey Research Malaysia, a private survey research firm. The survey contained three rounds, was fielded in 1976–77, and included a sample of 1262 households. These households were located in 52 geographic areas in the country. The questionnaires in the survey were designed to provide data for estimating the magnitude of key economic and biomedical relationships affecting birthspacing, family size, and breastfeeding patterns of families in Peninsular Malaysia. The goal was to identify factors amenable to public policy influence that directly or indirectly affect fertility outcomes. This summary report gave details of the survey method, including the ques-

tionnaires design, pre-testing of the design, choosing the sample for the study, the field personnel, survey control and data preparation. A summary of initial findings was also given at the end of the report.

**556. S.Z. BANU**

**Preliminary observations on disease and defects in 7,778 school children in Kuala Lumpur**

*Proceedings of the XIV Singapore–Malaysia Congress of Medicine, 19–22 July 1979*; edited by H.M. Gwee and S.C. Chiang; pp.434–437

The study was carried out to appraise the health status of primary school children in Kuala Lumpur and to assist those with diseases and defects. The mobile school health team moved from school to school examining the standard one pupils of all races. Special problems were discussed, parents interviewed and cases referred to hospitals. Health and family planning advice was given at all stages. There was a surprisingly high rate (47.8%) of children with upper respiratory tract infection and fevers, tonsillitis, pneumonia and bronchitis, a high percentage (57.6%) of them had dental caries, and some 11.1% had lice. A total of 12.3% of these children were also found to be underweight. The health and nutrition status of these school children living in the capital city was worse than was expected. It was emphasized that “if the child does not maintain adequate health, the benefits of education will be lost”.

**557. Y.H. CHONG, R.K.H. LIM, L.C. FOO, E.S. TEE, HANIS HUSSEIN and M. KANDIAH**

**Highlights and recommendations : Kelantan nutrition survey 1979**

*Report of the Division of Human Nutrition, Institute for Medical Research, Kuala Lumpur, 1979*; 10 p. (mimeographed)

The study was undertaken primarily to obtain basic information on the state of nutrition of a low-income segment of the population in Kelantan. Two fishing communities in the state, Kampong Pantai Mek Mas and Kampong Pantai Kundor, about 5 to 6 miles from Kota Baru were chosen for study. About 400 persons or roughly 35% of the total population were examined by a combination of clinical, anthropometric and biochemical examinations. A total of 101 households (about 40% of total) were visited to study their socio-economic status of which food consumption data were available or partially available from 87 households. Results of the study were highlighted and various measures were recommended for implementation and intensification.

**558. David A. McKAY**

**Nutrition, infection and Development : a ten year follow-up of children in Ulu Trengganu**

*Proceedings of the Third Asian Congress of Nutrition, 6–10 October 1980, Jakarta*; edited by Didin S. Sastrapradja, Soenartono Adisoemarto and Setijati Sastrapradja; pp. 603–611.

During the 1968 – 1969 period, detailed anthropometric, clinical, infectious, and socio-demographic data collected in a longitudinal study of the preschool-age children in ten relatively remote villages in the Ulu Trengganu district had shown that these children were faced with various nutritional and health problems (see McKay & Lim, 1971: McKay *et al*, 1971 and McKay, 1971)\*. Ten years later, in 1979, the same cohort was traced to re-determine their developmental status. Several tests of cognitive skill were given to the surviving cohort, and several aspects of the changing community, family, and child health were also assessed. It was observed that early childhood nutrition, indicated by weight and height, appeared to be a notable antecedent of later mental ability, although various environmental interactions were also involved. It was thus suggested that research and intervention efforts should focus on defining and enriching the total environment relevant to healthier child development. Clearly, good nutrition and freedom from major infections were important, closely inter-related components in the environment.

\* See abstract nos. 81, 118, and 453

#### 559. ONG CHEE LENG

**Some aspects of the health status of selected primary entrants pupils in Butterworth**  
*Dissertation submitted to the University of Malaya in part fulfillment for the Degree of Master of Public Health, 1980; 88 p.*

Some aspects of the health status of 310 Malaysian primary school entrants aged 6–7 years, from the three ethnic groups were studied in relation to some socio-economic factors of their parents. Two urban schools in Butterworth were selected for the study. Heights and weights were measured and examined for signs of nutritional deficiency for vitamin A, B and C, as well as other specific health problems. It was observed that the Indians were the worst off in anthropometric measurements. They were also economically the poorest and had the largest family size. Higher income children had better growth achievement than that of poorer children, irrespective of their ethnic group.

#### 560. C. PRATHAPA SENAN

**A study of the health status of an estate Tamil community**

*Dissertation submitted to the University of Malaya in part fulfillment for the Degree of Master of Public Health, 1980; 135 p.*

The health status of the Selangor River Division of the Sungei Buloh Estate in the Kuala Selangor District was studied. Several aspects were covered, including characteristics of the population, the available health facilities, infant feeding and weaning habits and the general nutritional status of the population, food supply, cost and production, as well as the available recreational and transport facilities. Of the total 50 households in the Division, 5 were selected for 24 hour recall dietary survey and 25 for the maternal and child health survey, carried out by personal inquiry, observation and questionnaire. It was reported that there was a lack of knowledge on infant and toddler feeding, and household diets were deficient in minerals and vitamins. There

was a need for intensive health education and for creation of awareness of the existing problems. The government health services should be expanded to include the estate population. It was felt that the general distrust among the workers and thus a lack of cooperation and motivation had to be resolved before any community projects could be carried out.

**561. PAUL C.Y. CHEN, MICHIEL K.C. CHAN, S.T. TEOH, BARBARA BENT, S.B. YAP, THOMAS FONG, FELICIA P.T. ONG, and MARY C.C. LEE**

**A nutrition study of the Interior, West Coast and Kudat Divisions of Sabah**

*Department of Special and Preventive Medicine, Faculty of Medicine, University of Malaya, Kuala Lumpur and Office of the Director of Medical Services, Sabah, Kota Kinabalu, Malaysia, 1981; 164 p.*

This fairly extensive survey was carried out between mid 1978 and continued until April 1980 in the Interior, West Coast and Kudat Divisions of Sabah. Approximately 49% of the people in the State live in these three Divisions. The predominant ethnic groups in the study areas were (in descending order) the Kadazans, Chinese, Bajaus, Malays and the Muruts; the report gave a brief description of each of these groups. A total of 3,672 children under 13 years were examined clinically and measurements of various anthropometric indicators taken. Blood and urine were also collected from the children for some biochemical examinations. An ecological assessment of five communities was also carried out. Data collected from visits to 106 households included household food consumption, food beliefs and practices, socio-economic status, food production, distribution and availability and the pattern of infections. Results of the survey showed that malnutrition was fairly extensive and an important problem in Sabah. Various recommendations were made, particularly those involving the health sector.

**562. Y.H. CHONG, R.K.H. LIM, L.C. FOO, E.S. TEE, T.K.W. NG, HANIS HUSSEIN, M. KANDIAH and A.T. TAN**

**Highlights and conclusions of a nutrition survey conducted on two padi-growing kampongs, Padang Endau, Mersing, Johore, March, 1981**

*Report of the Division of Human Nutrition, Institute for Medical Research, Kuala Lumpur, 1981; 34 p. (mimeographed)*

This is the second in the series of Nutrition Surveys planned by the Division to determine the types, magnitude, location and possible contributory causes of malnutrition amongst the rural communities in various states of Peninsular Malaysia (see abstract no. 557 for the first survey). Two underserved padi-growing villages, Kampong Semaloi and Kampong Bukit in the Mukim of Padang Endau, Mersing, Johore were selected for the study. The survey team examined 716 persons or 64% of the total population for clinical, anthropometric and biochemical indicators of nutritional deficiencies. Visits were also made to 111 houses (49% of total) to obtain information on socio-economic status, household food consumption pattern and food beliefs and practices. Main findings of the survey were reported in some detail.

563. Y.H. CHONG, E.S. TEE, T.K.W. Ng, HANIS HÜSSEIN, M. KANDIAH, P.H. TEO and L.C. FOO

Report on the status of community nutrition of four poverty kampungs, Baling, Kedah, February 1982

*Report of the Division of Human Nutrition, Institute for Medical Research, Kuala Lumpur, 1982; 34 p. mimeographed*

Following the survey in Kelantan (see abstract no. 557) and Johore (abstract no. 562), this is the third in the series of Nutrition Surveys conducted by the Division to gather more information on the current nutritional status of rural communities in Peninsular Malaysia. Four villages in the district of Baling, namely Kuala Kuang, Padang Lengkuas, Kemanggi and Seneyek were covered in the survey. The main economic activities of these villages were rubber tapping and padi growing. A total of 1191 persons or about 65% of the total population were examined for clinical signs of nutritional deficiencies. Biochemical indicators, weight and height and stool helminths were also investigated. Information on socio-economic status, household food consumption, food beliefs and practices were also collected from visits to 146 houses (44% of total). Results were presented in 13 tables and 6 figures. Various measures were recommended to help improve the nutritional status of the communities studied.

564. Y.H. CHONG, E.S. TEE, T.K.W. NG, S.B. YAP, and S.K. MOK

A study on the food and nutritional status of the armed forces

*The Medical Journal of Malaysia*, 37(1) : 46—51, 1982

The nutritional status of 158 soldiers of the Royal Malay Regiment from 4 different barracks, namely, Sungai Besi, Kuala Kubu Baru, Bentong and Seremban was studied. Weight and height of the subjects were measured. Blood and urine were collected for determination of a whole range of biochemical parameters. Samples of food served to the soldiers in the camps were also collected for nutrient analysis. Results obtained were compared with a previous survey conducted on the Malaysian Armed Forces by the ICNND in 1962 (see abstract no. 71). Biochemical assessment showed that with the exception of thiamin and riboflavin nutriture, the nutritional status of the soldiers studied appeared generally satisfactory. Anthropometric measurements of the soldiers in the present study when compared with those examined in 1962 indicated that they have the same mean height and appeared slightly heavier. Chemical analysis of their diet indicated a need for improvement of the dietary supply of vitamin A and some of the water-soluble vitamins.

565. DAYANG AMINAH ALI, SURIAH ABD. RAHMAN and ABDUL SALAM BABJI

*Kedudukan pemakanan kanak-kanak prasekolah di Tadika Trolak Utara dan Selatan Negeri Perak (Nutritional status of pre-school children in Trolak Utara and Selatan Kindergartens, Perak)\**

*Paper presented at the Symposium Biology 1, 2—4 November 1982, Universiti Keangsaan Malaysia, Bangi; 17 p. (mimeographed)*



The nutritional status of children aged 4–6 years from two kindergartens in Trolak Utara and Trolak Selatan was studied. Anthropometric measurements (weight, height and mid-arm circumference) were taken from 139 children of these kindergartens, both in a FELDA land development scheme. Food intake records were taken from a sub-sample of 55 of these children. The urea and creatinine levels of the urine of these children were also determined. It was found that the intake of all nutrients except protein and niacin were below the Malaysian Recommended Dietary Allowances. The prevalence of deficits in weight for age (malnutrition), height for age (stunting) and weight for height (wasting) were higher in Trolak Utara than in Trolak Selatan. About 16% of the children from both these two areas had a urea/creatinine ratio of less than 5.0.

\* Paper in Bahasa Malaysia

#### 566. KARNAIL SINGH

Nutritional assessment of a sample of primary school boys in an urban school in Seremban, Negri Sembilan.

*Dissertation submitted to the University of Malaya in part fulfillment for the Degree of Master of Public Health, 1982; 105 p.*

The nutritional status of 360 primary school boys of St. Paul's Institution in Seremban were determined using weight, height and arm circumference. When the anthropometric measurements of the three ethnic groups were compared, it was observed that the nutritional status of the Indians were the worst, whilst the Malays and Chinese were better off. Possible effects of various socio-economic factors such as paternal occupation, family size, birth order and the immunisation status on the nutritional status of the children were examined. The relationship between nutritional status and academic performance in school as measured by the mean annual examination results was also studied.

#### 567. PAUL C.Y. CHEN

Ecological basis of malnutrition among the Muruts of Sabah

*The Medical Journal of Malaysia*, 38(1) : 9–14, 1983

In an earlier anthropometric study by Chen *et al* (1981) (see abstract no. 561) in Sabah, it was found that 37.1% of the children examined were nutritional dwarfs, 12.5% were acutely malnourished, and 9.4% were stunted and wasted. It was also noted that Muruts were among the top five most malnourished ethnic groups in the State. The present study examined the ecology of a resettled Murut community of 89 households in the Keningau District to determine the interplay of various factors in the causation of malnutrition amongst this community. It was concluded that a variety of interrelated factors, including the lack of education, climatic and soil conditions, poverty, food habits and taboos, as well as diseases from poor sanitation and malaria contributed to the presence of malnutrition among rural Muruts. It was recommended that a multidisciplinary approach be taken to control the prevalent malnutrition and that the single most important measure aside from malaria control is education of the people and the development of marketable skills.

568. Y.H. CHONG, E.S. TEE, T.K.W. NG, M. KANDIAH; SITIM. SHAHID, R. HANIS HUSSEIN and P.H. TEO

Report of the status of community nutrition of six poverty kampungs, Perak Tengah, September 1983

*Report of the Division of Human Nutrition, Institute for Medical Research, Kuala Lumpur, 1983; 43 p. (mimeographed)*

This report is the fourth in the series of surveys on the current status of community in rural disadvantaged or poverty kampungs (see abstract nos. 557, 562, and 563 for previous studies). This latest survey was carried out in six riverine kampungs in the district of Perak Tengah, comprising of Kampung Bandar, Air Mati, Kuala Parit, Pasir Jenderis, Bandar Tua and Bukit Chawi. The main occupational activities of the villagers were padi-growing and rubber tapping. A total of 1252 persons or 63% of the population were examined clinically and their weights, heights and mid-arm circumference (the latter applicable only to pre-school children) were recorded. 1142 blood samples were obtained for nutritional biochemistry while about 503 stool and urine samples were returned for nutritional and parasite studies. Visits were made to 189 houses (47% of total) to obtain data on socio-economic status, household characteristics, food consumption, food habits and infant and young child feeding practices. Details of the findings were presented in 11 tables and 4 figures. Various recommendations were made for the reduction of malnutrition in the communities studied.

569. Y.H. CHONG

Malnutrition in the rural kampungs and approaches for its reduction

*Paper presented at the 4th Asian Congress of Nutrition, 1-4 November 1983, Bangkok; 21 p. (mimeographed)*

Between 1979 and 1983, the Institute for Medical Research conducted a series of community nutritional assessment surveys of rural poverty kampungs in the states of Kelantan, Johore, Kedah and Perak. The communities surveyed covered those living in the coastal, riverine and inland areas and included those engaged in a variety of economic activities such as padi-planting, rubber tapping, fishing or a combination of these activities. This is a preliminary report of the findings of these surveys. Details of the findings were subsequently published in an IMR Bulletin as given in abstract no. 571.

570. Y.H. CHONG\*

Tropical diseases research in Sabah: nutrition (a report of 1981 baseline studies by the IMR/WHO/HSS collaborative programme for research and training in tropical diseases, Sabah)

In: *Bulletin No. 20, Institute for Medical Research, Kuala Lumpur, 1983; pp. 77-89*

Nutritional studies were part of the Collaborative Programme of the Institute for Medical Research (IMR), the Health Services of Sabah (HSS) and the World Health Organization (WHO) initiated in 1980. Nutrition surveys were conducted on two occasions during 1981: the first on populations of 6 villages in the Bengkoka Peninsula in April 1981, and the second, a follow-up study on the village of Pantai, in October

1981. In the first survey, 101 pre-school children were measured for their weight, height and mid-arm circumference, and 157 of them were bled for Hb determination. The study showed that there was a serious problem of chronic protein-energy malnutrition and anaemia in the villages studied. A follow-up and more detailed study was thus conducted in one of the villages, Kampung Pantai in October. A total of 48 children 0 to 6 years and 40 women of child-bearing age were investigated using a combination of clinical, anthropometric and biochemical studies. Twelve of the total of 44 households were also interviewed for their socio-economic status, food habits and food consumption pattern. Results of this second study were also presented in detail.

\* Also see abstract no. 574.

571. Y.H. CHONG, E.S. TEE, T.K.W. Ng, M. KANDIAH, R. HANIS HUSSEIN. P.H. TEO and SITI M. SHAHID

**Status of community nutrition of poverty kampungs**

*Division of Human Nutrition, Institute for Medical Research Bulletin No. 22, Kuala Lumpur, 1984; 65 p.*

This monograph presents the findings of four separate nutrition surveys conducted at approximately yearly intervals between September 1979 and September 1983 (see abstract nos. 557, 562, 563 and 568 for the separate reports). The impetus for these studies was said to have been provided initially by the nationwide survey on the incidence of poverty in rural disadvantaged kampungs conducted by the Prime Minister's Department during 1978. This highlighted the need to assess the status of nutrition of such communities of whom we have limited and inadequate knowledge. The series of studies mentioned were conceived and planned during early 1979 as part of the Division's overall research strategy for the Fourth Malaysia Plan. They involved the examination of about 3600 persons drawn from 14 kampungs in the states of Kelantan, Johore, Kedah and Perak. Blood specimens were obtained from about 3000 individuals, while 1,500 persons provided stool and urine samples. Visits were made to 548 houses for collection of data on socio-economic characteristics, food consumption and pattern, food beliefs and practices. Findings from each of the 4 areas were separately presented as well as combined. Wherever appropriate, findings of the different areas were compared. Correlative studies were also carried out for some of the parameters measured. It was found that the incidence of poverty was high; 78% were found living below the poverty line. There was a lack of proper sanitation and clean water in the majority of households contributing towards a contaminated environment that gave rise to a high incidence of intestinal parasitism, skin infections and head lice. Chronic undernutrition, i.e. "stunting" was found in major proportions of pre-school children (43%) and primary school children (49% for boys and 25% for girls). There was a preponderance of underweight people compared to overweight persons amongst the adult population. Anaemia, large due to nutritional iron deficiency, was found in practically all sections of the community with moderately high prevalence rates in pre-school and primary school children, adolescent boys and girls, women of child-bearing age, senior male and female adults over 46 years old. Household food consumption and distribution studies revealed a shortfall of calorie consumption of 66%

of households and a deficit of dietary protein in 34% households. Various measures were recommended for the improvement of family nutrition in the communities studied.

**572. FARIDZAH JAAFAR**

**The assessment of the nutritional status of pre-school children amongst Malay, Chinese and Indian in the District of Hulu Langat, Selangor.**

*Dissertation submitted to Universiti Kebangsaan Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Science with Honours in Food Science and Nutrition, 1984*

A nutritional study was conducted in the district of Hulu Langat, Selangor involving 107 children (42 Malays, 32 Chinese and 33 Indians) of preschool age (4 – 6 years). A combination of anthropometric measurements, determination of urea and creatinine in urine and a dietary survey using 24 hr recall was used. Among the three races studied, malnutrition seemed to be more pronounced among Indian children which showed a greater prevalence of underweight, wasting and malnourished. However, occurrence of stunting was highest among the Chinese, followed by Indian and Malay children. It was found that the intake of all nutrients except for energy, calcium, and niacin were below the Malaysian Recommended Dietary Intake. None of the Indian and Chinese Children had a urea:creatinine ratio of less than 5.0, whereas amongst the Malay children, a prevalence of 7.1% was observed.

**573. SALAMATU GOBIR, THELMA L. RAMOSO and YINGYONG TAOPRASERT**

**A community diagnosis: the nutritional status of the preschool children in a Chinese fishing community, Bagan Pasir Penambang, Kuala Selangor, Malaysia**

*Dissertation submitted to the University of Queensland and Universiti Kebangsaan Malaysia in partial fulfillment for the requirements for the Degree of Master of Community Nutrition, 1984; 133 p.*

The study was conducted in the Malaysian Chinese fishing village of Bagan Pasir Penambang, Kuala Selangor to determine the nutritional status of 105 preschool children from 51 sample households. A combination of anthropometric, biochemical, clinical and dietary assessments were used. Stool examination for parasite infestations was also carried out. Other related factors contributing to nutritional status like socio-economic, dietary practices, health conditions and food availability were studied. Correlation between the variables measured was also examined. A short and long term planning for the community were formulated on the basis of the analytical interpretations of the collected data.

**574. M. KANDIAH, MARY LEE, T.K.W. NG and Y.H. CHONG**

**Malnutrition in malaria endemic villages of Benkoka Peninsula, Sabah**

*Journal of Tropical Paediatric, 30:23–29, 1984*

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, Sabah, East Malaysia 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, and 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. Results of the study, presented in detail, indicated that chronic protein-energy malnutrition and iron deficiency anaemia were serious nutritional problems in the communities studied. The interaction of malaria infection and helminthic infestation with nutrition were examined. Various recommendations were made to improve the health and nutritional status of the communities.

#### **575. NORLIDA MOHD. DARUS**

**The assessment of nutritional status of Malay pre-school children in Sungai Behrang and Sungai Klah in the State of Perak**

*Dissertation submitted to Universiti Kebangsaan Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Science with Honours in Food Science and Nutrition, 1984*

An assessment of the nutritional status of 111 children studying in kindergartens in FELDA Sungai Behrang and FELDA Sungai Klah in Perak was carried out. The study was based on anthropometric measurements, 24-hour dietary recall and the determination of hydroxyproline index in the urine. Moderate and chronic malnutrition was observed in children from both the areas. The deficits in weight for age (underweight), height for age (stunting) and weight for height (wasting) were however higher in Sungai Behrang. The intake of all nutrients except protein, thiamin and vitamin C were below the Malaysian Recommended Dietary Intake values. It was also found that 49% of the children from Sungai Behrang and 43% from Sungai Klah had a hydroxyproline index of lower than 1.5, a level regarded as indicative of poor physical growth.

#### **576. PRASONG TEINBOON, NASIB ALI WAZIR and SUMLOCK NIMSAKUL**

**An assessment of the nutritional status of children (1–5 years) of paddy growing community, Village Sawah Sempadan Block B and I, Kuala Selangor District, Peninsular Malaysia.**

*Dissertation submitted to the University of Queensland and Universiti Kebangsaan Malaysia, in partial fulfillment of the requirements for the Degree of Master of Community Nutrition, 1984; 186 p.*

A community diagnosis was made to determine the nutritional status of children (1–5 years) of a Malays community in the rice-growing village of Sawah Sempadan Block B and I in the district of Kuala Selangor. The community comprised of 115 households with a population of 605. Forty of these households, with children 1–5 years were selected for detailed study on their socio-economic status, health, food consumption and production. These children (total=51) were examined for their nutritional status using clinical, anthropometric and biochemical methods. Stools of these children were also examined for parasitic infestations. Results of the study were presented in detail in the report. Various statistical analysis of the variables studied were also carried out. The malnutrition found in the children was described as mild to moderate, associated

with iron and calorie deficiency and was thought to be due to low nutrient intake, maldistribution of the food within the household, low household income, large household size and poor sanitation. It was felt that the findings could be used as a basis for the nutrition and health planning of the village.

## **NUTRITION SURVEYS:—**

### **ANTHROPOMETRIC**

#### **577. G.R. WADSWORTH**

##### **Heights and weights of Sarawak school children**

*Sarawak Museum Journal*, 11(21–22) : 307–320, 1963

Height and weight records of Sarawak school children measured in 1961 were used for the analysis. A total of 6,309 records were found to be satisfactory for use, most of which were for Chinese children and a smaller proportion for Malays and Dayaks. These measurements were compared with a British reference of 1949. It was found that Sarawak children were smaller and usually thinner than London children were in 1949. Results of the study were discussed in relation to the importance of pre-school nutrition, and the use of cross-section versus longitudinal measurements of heights and weights in the assessment of nutritional status. The accuracies of the measurements obtained in 1961 and the usefulness of such data were also examined.

#### **578. SURINDER SINGH**

##### **A cross-sectional study of heights and weights of primary school children in Besut, Trengganu**

*Dissertation submitted to the University of Malaya in part fulfillment for the Degree of Master of Public Health*, 1975; 48 p.

A total of 1204 school children between the ages of 6 – 8 years in Besut, Trengganu were examined for their heights and weights over a period of 3 years (1972–1974). The majority of the children were Malays. Details of the data obtained were presented and compared with that of children in Kuala Lumpur and Petaling Jaya, as well as those from other countries. Problems encountered in the study and errors in the data collection were discussed.

#### **579. S.T. CHEN**

##### **Standards for subcutaneous fat and arm circumference in Malaysian school children** *Journal of the Singapore Paediatric Society*, 19(2): 97–100, 1977

A study was carried out to obtain standards for triceps skinfold and mid-arm circumference of Malaysian children. A group of 686 primary school children of the major racial groups were followed yearly from 1969 to 1975. Tricep skinfold and mid-arm circumference measurements of these children were presented in percentile charts

separately for the boys and girls. For comparison, the children were divided into those of low and high income groups. Children from the latter group was found to have more fat and bigger arm circumferences than those from low income families. Comparison of the racial groups showed that Chinese children had significantly more fat and bigger arm circumferences than Indian children. In both boys and girls, the average triceps skinfold and arm circumference values approximated those of Singapore children but were lower compared to British and American children.

#### **580. G.R. WADSWORTH**

##### **Weights and blood pressures of women who attend family planning clinics in Sarawak**

*The Medical Journal of Malaysia*, 36(3) : 148–150, 1981

A total of 1966 records of weight (and 500 records of blood pressure) from the records of the Medical Department in Kuching for the past few years were extracted and analysed. Ethnic composition of the women and the mean weight of each ethnic group were tabulated. Results were compared and found to be greater than those reported by Anderson (1978) (abstract no. 97) and an unpublished report of the Medical Department, Sarawak. It was suggested that analysis of the records of women who repeatedly attend the family planning clinics would provide information of trends in the mean weight of these women over an appreciable length of time. These trends could be more valuable as indicators of fluctuations with season and over longer periods, in the availability of food.

#### **581. Y.H. CHONG and HANIS HUSSEIN**

##### **Recent birthweight distribution and trends in Kuala Lumpur**

*The Medical Journal of Malaysia*, 37(1): 40–45, 1982

Birthweight in relation to the duration of gestation is regarded as an important index of fetal growth and development. It has also become an indirect indicator of the general health and level of socio-economic development of a country as well as reflection on the gap between the privileged and the less privileged in the same community. The study was undertaken to provide recent information on recent birthweight distribution, pattern, incidence of low birthweight and to examine birthweight in relation to the sex and length of infants, gestational age, gravida and maternal age. The birthweights of 13,614 singleton infants comprising 5376 Malays, 5352 Chinese and 2886 Indians born at the Maternity Hospital, Kuala Lumpur, during 1973, 1975 and 1977 were extracted from the records and analysed. Mean birthweight of Chinese infants were significantly heavier than the Malay infants, who in turn were significantly heavier than the Indians. The Indians were also found to have the highest incidence of low birthweight. The mean gestational period and the proportion of full-term births were similar for all 3 races; maternal age at first birth was also closely similar. Significant correlations were found between birthweight and length of neonates, birthweight and gravida, birthweight and maternal age. Comparing the results obtained to those reported by Thomson (1962) (abstract no. 109), it was found that present-day Malay and Indian full-term infants were significantly heavier than their counterparts born at the same hospital two decades ago, but no difference in birthweight

was observed for Chinese infants during this time interval. The gap between the incidence of low birthweight found in Malaysia and those in the developed countries was said to be narrowing and may be taken to reflect the overall effects of socioeconomic development, including the greater availability of general health and antenatal care throughout the country since its Independence in 1957.

**582. J. DAVANZO, J.P. HABICHT and W.P. BUTZ**

**Assessing socioeconomic correlates of birthweight in Peninsular Malaysia : ethnic differences and changes over time**

*Rand Corporation Publications N-1637-AID*, 1983; 66 p.

This paper presented evidence from the Malaysian Family Life Survey (MFLS) (abstract no. 555) that mothers' reports of their babies' birthweights, including reports of unweighed babies' approximate size at birth, can be used to examine many biological and socioeconomic correlates of birthweight. The study used a sample of 5,583 singleton births that occurred between 1945 and 1976. In these data, the frequency distribution of birthweights and their bivariate and multivariate relationships with the biological correlates of mother's age, baby's sex, first parity, and infant mortality were found to be consistent with those found in prospective studies. A new biological correlate, mother's age at menarche, was introduced as a proxy for the mother's nutrition during childhood. Late age at menarche was found to be associated with low birthweight. Other results showed that mothers younger than 20 years and older than 35 appeared to be at greater risk of bearing small babies, but the former effect was no longer important when parity was controlled. Short birth intervals were associated with small babies, due to the combined effect of prematurity and maternal nutritional depletion; higher income appeared to lessen the deleterious effect of short intervals. Indian babies weighed significantly less than those of other ethnic groups. Furthermore, birthweights were found to have increased since the 1950s for Malays and Chinese, but not for Indians. This lower birthweights and lack of improvement over time for Indians appeared to be due to close birthspacing, lack of access to medical care, and falling incomes.

**NUTRITION SURVEYS:—**

**BIOCHEMICAL**

**583. T.K.W. NG**

**Biochemical assessment of the nutritional status of Shah Alam industrial workers.**

*Report of the Division of Human Nutrition, Institute for Medical Research, Kuala Lumpur, 1978; 10 p. (mimeographed)*

The Ministry of Health conducted a survey in 1977 to obtain baseline information regarding the health and socio-economic status of the industrial workers in Shah Alam. The study, involving several Departments, covered a total of 770 workers. This report presents the results of a study of the nutritional biochemistry of a subsample of 135 male and 38 female workers whose ages ranged from 18 to 52 years.



Blood was collected and determined for various biochemical parameters of nutritional status. It was found that protein and vitamin A of these workers appeared satisfactory; their iron and thiamin status however, were a cause for concern. It was suggested that appropriate remedial measures be taken to avoid affecting the productivity of these factory workers. Improvement of the subsidised lunches served in the factory canteens, and provision of iron and vitamin supplements to the workers were recommended.

**584. THOMAS H.M. FONG, MARY C.C. LEE, R.L. CAMPOS and MICHIEL K.C. CHAN**

**A study on the incidence of lactose malabsorption and milk intolerance amongst primary school children in Sabah**

*Journal of the Malaysian Society of Health*, 2(1) : 11–14, 1981

675 'healthy' children (male:female ratio = 0.99) selected at random from 2 urban, 2 suburban and 3 rural primary schools were studied for lactose malabsorption. The subjects included 205 Kadazan, 184 Chinese, 165 Brunei, 58 Bajau, 30 Malay and 33 children of miscellaneous race. Lactose tolerance test was performed on the subjects after an overnight fast. Lactose malabsorption was defined as reduced absorption of lactose as a consequence of low lactase activity, where normal lactose absorption was taken as a maximum rise of blood glucose level of greater than 20 mg/dl above fasting level. The overall prevalence of lactose malabsorption in the children studied was found to be 47.6%. The paper also presented the distribution of malabsorption amongst the various ethnic groups. When 283 out of the 321 children found to have lactose malabsorption were investigated for milk intolerance, a prevalence rate of 32.2% was observed. The results of the study indicated that there was a positive association between lactose malabsorption and (i) milk intolerance, (ii) increasing age, and (iii) non milk drinking habits. Compared to rural and suburban children, urban children appeared to have a greater tolerance for lactose and milk.

**NUTRITION SURVEYS:—**

**DIETARY**

**585. P.W. BEDFORD**

**Sea Dayak diet : a longhouse survey**

*Sarawak Museum Journal*, 9(13–14) : 203–214, 1959

Food consumption in *Rumah Bujak*, a longhouse in Nanga Pruan near Simanggang was studied. This was thought to be an average longhouse as regards position, standard of construction and state of cleanliness. The people had attained a high level of prosperity by Sea Dayak standards, way ahead of longhouses in many other areas of the Second Division. Out of the total of 30 doors in the longhouse, data from 25 were accepted for analysis. As a sufficient proportion of the population of the house were able to write, each room was asked to keep a diary of everything they ate and drink at every meal for one week. Protein, fat, carbohydrate and calorie content of the food

items consumed were then calculated from food tables. The report tabulated the estimated minimum, maximum and average daily intake of these nutrients for an average adult male for all samples studied. Example of a poor, good and a monotonous diet were presented. Adequacy of the diets was compared with that of requirements.

#### **586. CHEAM SOON TEE and TAN BOCK THIAM**

##### **Food consumption in Malaysia – present levels and future prospects for self-sufficiency**

*Proceedings of the Conference on Malaysian Food Self-Sufficiency, 21–23 August 1975, Petaling Jaya*; edited by B.T. Tan, F.S.C.P. Kalpage, G.C. Ch'ng, S.T. Cheam, and K.C. Wong; pp. 37–49

The 1972 food consumption level in Peninsular Malaysia was first estimated using the food balance sheet approach. The estimated per capita daily intake of about 2530 calories and 58 grams of protein (with 36% from animal origin) appeared to be adequate compared with the recommended dietary allowances. Based on these consumption figures and using projected population, income and elasticities of demand for various food commodities, the estimated consumption figures in the years 1980, 1990 and 2000 were next obtained. For the year 2000 for instance, a total consumption of 3305 calories and 34.5 g of animal protein was predicted. The required rates of growth in production in order to achieve self-sufficiency in all food commodities were then computed. The results obtained indicated that for food commodities such as rice, poultry, pork, fish, eggs, vegetables and fruits, the desired rates of growth are within attainable range. For beef and mutton, fats and oils, much more efforts are needed to attain self-sufficiency. For sugar and milk, the likelihood of achieving self-sufficiency was said to be dismal. The importance of establishing targets was emphasized, as it provided some benchmark against which we can measure our current performance against the targets desired.

#### **587. N. CHANDRASEKHARAN and T. MARIMUTHU**

##### **An inquiry into the state of food, nutrition and health in plantations**

*The Medical Journal of Malaysia*, 34(3) : 226–229, 1980

The study aimed to assess the food and dietary habits of workers and their families in two plantations in Selangor. Selected households in these plantations, one a rubber plantation and the other having both rubber and oil palm, were visited regularly and information gathered by personal interviews and observations. Various socio-economic data were also collected. Results presented included average family size, household income, expenditure on various food items, habit of drinking of alcoholic beverages, and farming and gardening activities. Comparing the nutrient intake of these households with the recommended national allowances, it was found that their diets (especially those in plantation I) were inadequate in calories, protein, calcium, iron and riboflavin. Measures recommended to improve the nutrition, health and productivity of these workers and their families included improvement in the socio-economic status, health and nutrition education, improvement of environmental sanitation, agriculture extension services, and food subsidies for infants and vulnerable groups.

**588. ZANARIAH JIMAN, MOHD. HASHIM and ABU KASIM**

**Food consumption and food optimization system in a padi-growing area in Malaysia  
– Pendang, Kedah**

*Report of the 4th ASEAN Workshop on Food Habits, 29 November – 4 December 1982, Yogyakarta, Indonesia; 21 p.*

A total of 303 households in Pendang district, 145 households from the town area and 158 from the rural areas, were selected by stratified multistage random sampling for the study. Race structure of these households was approximately 80% Malays, 14% Chinese, 5% Indians and 4% others (mainly Thais). The basic economic structure of the district was agriculture and about 50% of the labour force was involved with agriculture. Further analysis of the occupation of the heads of the households showed that 40% of the Malays were predominantly engaged in agriculture (mainly padi growing and rubber tapping), 74% of the Chinese and all the Indians were doing business. Examination of the income pattern of the households revealed that 22% of the Malays and 5% of the Chinese had an average monthly income of <\$200. It was found that more of the heads of households in the rural areas than those in town areas had no education, and families with incomes of less than \$600 per month had breadwinners without formal education or only primary education. The average household spent about three fifths of their incomes for purchasing foodstuffs. Several possible farm projects that could be successfully integrated in the rice farming system were discussed such as the planting of fruit trees and vegetables, rearing of poultry and livestock, cash crop farming, and fish culture. It was felt that such activities could supplement the income as well as improve the food consumption of the population in the area.

**589. EILEEN KENNEDY**

**Determinants of family and preschool food consumption**

*Food and Nutrition Bulletin, 5(4) : 22–29, 1983*

The paper was aimed at answering three questions:

- what is the effect of increases in income on the caloric intake of a population?
- what are the determinants of households caloric intake?
- what effect does family food intake have on a preschooler's caloric intake?

Data from studies carried out in Thailand, Malaysia, Sudan and Mexico City were used to provide answers to these questions. The Malaysian data used were obtained from a 1974 Muda Farm Household Survey carried out by the World Bank. Analysis of the data showed that, in general, caloric intake increases as one moves from the lowest to the highest income and/or expenditure group. Higher-income families were said to be more likely to have an adequate dietary status than low-income households. It was however, pointed out that there were high-income households who fail to achieve caloric adequacy. Thus income was only one determinant of family caloric intake. There was no direct effect of income on preschool nutritional status as judged by weight and height for age data. It was also seen that caloric availability within the household may not be a precise indicator of a child's nutritional status.

#### 590. SITI MARIAM ABDUL

*Pengambilan zat ferum dan asid askorbik siswi tahun pertama UPM, Serdang Selangor*  
(Iron and ascorbic acid intake of first year female students of University of Agriculture Malaysia, Serdang, Selangor)\*

*Project report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirement for the Degree of Bachelor of Science (Human Development), 1983*

Forty five (10%) of the first year female students of University of Agriculture Malaysia, Serdang, were chosen randomly for a study of the intake of iron and ascorbic acid. Most of these students were Malays, and were aged between 18 to 20 years. Analysis of the food served by each residential college and the amount of food taken by each subject was carried out using a food composition table. All the subjects were found to have iron intake of less than the recommended dietary allowance (RDA). However only 25 of the students had an intake of less than two-third of the RDA. Seventeen of the students were deemed to have an insufficient ascorbic acid intake. The food served by the college was found to meet the RDA for both nutrients. The insufficient intake of iron and ascorbic acid could thus be the result of taking an insufficient amount of foods which contain these two nutrients.

\* Report in Bahasa Malaysia

#### 591. ZANARIAH JIMAN and MD. YUNUS JAAFAR

*Food intake trend of the population in the urban and rural areas – Segamat, Johore*  
*Report No. 277, Food Technology Division, MARDI, Serdang, 1983; 33 p.*

The survey was carried out to study the food intake trend of the population of the district of Segamat. Collection of data was made by personal interview with a household member, usually the homemaker or head of household using a precoded questionnaire. Information about food expenditures, frequency, received as gifts or home produced were acquired for the determination of the dietary pattern of the households. Data on general characteristics of the households were also collected. A total of 370 households were studied. 200 of these were in the town areas and 170 of them were from 14 kampungs selected from 3 mukims. Results obtained were presented separately for the town and rural areas, as well as for the three major ethnic groups.

#### 592. ZAWIAH HASHIM, AMINAH ABDULLAH and ABDUL SALAM BABJI

*Food intake and factors influencing data accuracy in a rural community*

*Paper presented at the 4th Asian Congress of Nutrition, 1–4 November 1983, Bangkok*

A preliminary dietary survey of protein and calorie intake of rural adults, adolescents and children was conducted in various Malays villages of West Malaysia. Enumerators, trained with basic knowledge of food and nutrition, collected data by filling the relevant information required in a standard questionnaire. Results obtained indicated that calorie intakes were lower than the recommended dietary intake for Malaysia for the three age groups. Protein intakes were found to be higher than the recom-

mended allowances. Poor cooperation, lack of nutritional knowledge and attitudes of the rural Malays were some of the factors affecting data collection in a dietary survey.

**593. AMINAH ABDULLAH, ABDUL SALAM BABJI and ZAWIAH HASHIM**

**Food intake of the rural community**

*Paper presented at the International Seminar on Family in the Eighties, 20–23 February 1984, Universiti Pertanian Malaysia, Serdang; 16 p. (mimeographed)*

A total of 169 individuals from two villages in Selangor, namely Jendram Hulu (n=70) and Hulu Langat (n=99) were surveyed at random for their daily intakes of foods. The subjects were questioned on the food items consumed for all meals in a day, and the protein and calorie content of the foods calculated from food tables. Subjects were categorised into three age groups (adult, adolescent and children). Results obtained indicated that the mean protein and calorie intakes of the subjects of Hulu Langat were higher than that of Jendram Hulu. Protein intake for all age groups in both villages were found to be higher than the Recommended Daily Allowance of Malaysia, while the calorie intake was slightly lower than requirement. Dietary pattern of the subjects was also discussed.

**NUTRITIONAL ANAEMIA**

**594. E. GEORGE, N. ADEEB and J. AHMAD**

**Iron stores in pregnancy**

*The Medical Journal of Malaysia, 35(2) : 129–130, 1980*

Ninety six women attending the antenatal clinic of the General Hospital, Kuala Lumpur on their first visit were randomly chosen for study. Blood was collected for determination of HB, MCV, MCH, MCHC and serum ferritin. Sixty women who were not pregnant were analysed as controls. Results obtained for the three trimesters were presented and compared with the controls. It was shown that with the progression of pregnancy, there was a fall in serum ferritin concentration. It was also suggested that HB and red cell indices cannot be used to assess iron status in these women.

**595. JAAFAR ALI, KHALID HASSAN and HAMID ARSHAT**

**Suggestion of an active transport of iron to the fetus in human pregnancy and its dependence on maternal serum iron levels**

*The Medical Journal of Malaysian, 36(4) : 215–219, 1981*

Subjects of the study were mothers admitted to the labour wards at the Maternity Hospital, Kuala Lumpur. Values for serum iron, total iron binding capacity, percent transferrin saturation, (n= 19 for these three parameters), serum ferritin (n= 10), haemoglobin and reticulocyte counts (n= 30 for these two parameters) in blood at labour and cord blood at parturition were tabulated and compared. It was observed that the values for all these parameters were significantly higher in the cord blood than

those in the maternal blood. Results obtained were discussed in relation to the possible mechanism of transport of iron to the fetus. It was concluded that findings obtained were in agreement with reports by other investigators that this transport across the placenta occurs against a gradient in favour of the fetus, suggesting that it is an active mechanism. This is thought to be of clinical significance because it means that this mechanism ensures adequate supply of iron for the normal development of the fetus except probably in rare cases of severe maternal iron deficiency when the fetus may receive subnormal amounts of iron. It was suggested that mothers should be protected from developing iron deficiency by iron supplements given throughout pregnancy.

#### 596. NAWALYAH ABDUL GHANI\*

**Iron and zinc utilization of humans as affected by calcium/phosphorus/ascorbic acid supplementation of mixed food diets**

*Thesis submitted to the University of Nebraska in partial fulfillment of requirements for the Degree of Master of Science, 1981; 76 p.*

The utilization of iron and zinc by humans as affected by calcium/phosphorus/ascorbic acid supplementation of mixed food diets was investigated. Two controlled human feedings studies, involving 22 healthy adults were carried out. During the experimental periods, the subjects were fed a basal diet alone or the basal diet plus ascorbic acid and mineral supplements in various combinations. Blood samples were taken at the beginning of each study and at the end of each experimental period for the monitoring of haematological parameters. Complete urine and stool collections were made by each subject for the determination of iron and zinc excretion. In general, results indicated that ascorbic acid increases iron utilization but decreases the utilization of zinc. Dicalcium phosphate was found to have a negative influence on the utilization of both mineral nutrients.

\* Author currently at the Department of Human Development Studies, University Pertanian Malaysia, Serdang, Selangor.

#### 597. E.S. TEE, M. KANDIAH, JAAFAR ALI, V. KANDIAH, MOHD. RUSLI ZAHARI, R. KULADEVAN and ZULKAFI HAMZAH

**Nutritional anaemia in pregnancy : a study at the maternity hospital, Kuala Lumpur**  
*Malaysian Journal of Reproductive Health, (in press)*

Data on the prevalence and pattern of nutritional anaemia in the Maternity Hospital, Kuala Lumpur were presented. 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, PCV, MCHC, and TRBC), serum iron, transferrin saturation and ferritin, serum folate as well as protein and albumin were determined. Based on Hb and PCV values, 30–40% of the women could be considered anaemic; approximately 50% of them presented with unsatisfactory serum iron, transferrin saturation and ferritin values; 60.9% had

low serum folate levels; and about 30% may be considered to be of poor protein nutriture. Anaemia in the study population was seen to be related mostly to iron and to a lesser extent, folate deficiency. Haematological, iron, folate and protein status was observed to be the poorest amongst the Indian women, better in the Malay group and generally the best amongst the Chinese women. Birth records of 169 of these women revealed that all of them had live births. Nearly all the infants were delivered by standard vaginal delivery. The mean gestational age was 38.6 weeks. One of the infants had a birth weight of <2.0 kg; incidence of low birth weight, <2.5 kg, was 8.3%. Although there was a trend of deteriorating haematological, iron and protein status of women from the 0, 1–3 and >4 parity groups, these differences were not statistically significant.

#### 598. TEE E SIONG

**Nutritional anaemia : a review of the problem with particular emphasis on Malaysia**  
*Malaysian Journal of Reproductive Health*, (in press)

The review attempted to cover the whole spectrum of the anaemia problem, from defining the disorder to the intervention measures that may be implemented. The first section dealt with the definition of nutritional anaemia and the haemopoietic nutrients involved. The various factors involved in and/or related to a balance of these nutrients in the "normal" individual was next discussed, which covered aspects such as how these nutrients are stored in the body, through what channels our body loses them, the efficiency with which our body absorbs these nutrients from the diet, and our daily requirements for them. This led logically to a consideration of the factors that would bring about an imbalance and the resulting deficiencies. A discussion of the various methods of diagnosing and measuring such deficiencies, as well as the prevalence of the problem followed. The possible deleterious effects of these deficiencies to our body and health were given particular attention. Finally, the various intervention measures that may be undertaken to control or alleviate such deficiencies in the community were considered. In all these areas, wherever appropriate, recent findings and understandings were presented. In those areas where Malaysian studies have been reported, these were reviewed in some detail. It was aimed at providing a clear understanding of the work done in the country in the overall perspectives of recent knowledge on the problem of nutritional anaemia. The review contained over 300 references.

### VITAMIN A DEFICIENCY

#### 599. N. CHANDRASEKHARAN

**A study of liver reserves of vitamin A in Malaysians**

*Malaysian Journal of Pathology*, 4:43–47, 1981

Liver reserves of vitamin A were estimated by analysis of liver specimens obtained at autopsy from 92 subjects. The mean concentrations of vitamin A in adult livers were reported to be as follows:

(a) 100  $\mu\text{mol/kg}$  (29  $\mu\text{g/g}$ ) in accidental adults ( $n = 50$ );

(b) 94  $\mu\text{mol/kg}$  (27  $\mu\text{g/g}$ ) in disease related deaths ( $n = 25$ ); and

(c) 84  $\mu\text{mol/kg}$  (24  $\mu\text{g/g}$ ) in newborns ( $n = 17$ ).

There were considerable variations between the different racial communities. Results obtained were said to be much lower than those reported for the developed countries. Inadequate consumption of vitamin A rich foods was suggested as a possible cause for the low liver reserves of vitamin A in Malaysians.

#### 600. SUHAILA MOHAMED

*Adakah anda cukup vitamin A? (Are you deficient in vitamin A?)\**

*Agraria*, 1982; pp. 164–166

A greater portion of the article discussed the signs and symptoms of vitamin A deficiency. Other topics covered include the treatment of vitamin A deficiency, daily requirement of the vitamin and its food sources.

\* Article in Bahasa Malaysia

### PROTEIN–CALORIE MALNUTRITION

#### 601. S.T. CHEN

**Prevalence and effects of protein-calorie malnutrition in Malaysia**

*Report of the Seminar on Health, Food and Nutrition, 15–20 September 1979, Penang*; 9 p. (mimeographed)

Various nutrition surveys conducted in Malaysia in the 1960's and 70's were reviewed to give an idea of the prevalence of PCM in the country. It was pointed out that although severe PCM was not frequently reported, mild to moderate degrees of PCM were common, especially among infants and preschool children and the economically deprived group with large families. Malnutrition is a major contributory factor to high mortality and morbidity of childhood. There is extensive evidence that resistance to infections is markedly reduced in severe PCM. Malnutrition also slows down the overall rate of growth of children. Recent investigations have been concerned with the possible permanent effects of undernutrition in early childhood on mental development.

#### 602. Y.H. CHONG

**The prevalence of childhood malnutrition : its measurement, what it means and its uses**

*The Medical Journal of Malaysia*, 34(4) : 329–335, 1980

The prevalence of childhood malnutrition in a population or community may be measured in terms of mortality and morbidity. Toddler mortality rate, for instance, is widely accepted as a rough indicator of malnutrition. Morbidity with reference to malnutrition is usually monitored by growth retardation. This is reflected either by a loss in weight or a slowing of linear growth, i.e. height. The three widely used indi-



cators of growth for monitoring childhood malnutrition are: weight-for-age, weight-for-height and height-for-age. Based on these criteria, the prevalence of protein-energy malnutrition in several rural and urban areas of Peninsular Malaysia were briefly discussed. Evidences from such mortality and morbidity data were said to suggest an improvement in the nutritional situation in the rural areas. It was emphasized that nutritionists in Malaysia have a continued role to play in defining and drawing attention to the country's nutritional problems and in monitoring the trends of nutritional status in the wake of the country's rapidly changing economy and programmes for eradicating rural poverty.

**603. TONY NG KOCK WAI, RASAMEE SUPASRI and CECILIA A. FLORENCIL**

**Rehabilitation of malnourished preschool children with Nutri-Pak**

*The Medical Journal of Malaysia*, 35(2) : 122–128, 1980

The projects involved 13 Filipino malnourished preschool children from 12 families in the *barrio* of San Vicente, Bulacan, Philippines. A preliminary 24-hr recall food consumption study revealed an inadequate intake of both calories and protein for these children. It was thus thought that they could benefit from supplementation with Nutri-Pak. At the end of the 42-day supplementation period, during which the weights of the children were monitored at 6-day intervals, it was observed that their weight gains were much lower than expected and only one child had increased in % standard weight for age by 5%. Various factors were thought to have contributed to this, including the low consumption of Nutri-Pak, a partial replacement by the food supplement of the children's diet in the home, uncooperative mothers, and illnesses.

**604. R. GEORGE, L.C. FOO, Y.H. CHONG and S.C.E. ABRAHAM**

**Severe protein-energy malnutrition in Kuala Lumpur**

*Journal of Tropical Pediatrics*, 27: 259–262, 1981

Despite the rapid pace of development occurring around the urban city of Kuala Lumpur, PEM can still be found in its midst. The present report describes the clinical features, anthropometry, nutritional biochemistry, associated infection and illnesses, and socio-economic background of 25 severe PEM cases (13 of marasmus, 7 of marasmic kwashiorkor and 5 of kwashiorkor) admitted to the Paediatric Unit of the General Hospital during 1975. Some notes on their management were also given. The size of the disadvantaged group of urban dwellers around the city suggests that there would be many other urban children who are potentially vulnerable to the development of PEM.

## **OTHER NUTRITIONAL DEFICIENCY DISEASES**

**605. IVAN POLUNIN**

**Endemic goitre in Malaysia**

*Assignment Report, Malaysia 5602–E (0081), Regional Office for the Western Pacific, World Health Organization, 1971; 57 p.*

This WHO Assignment was aimed at assisting the Ministry of Health Malaysia in the planning and implementation of surveys of endemic goitre and endemic cretinism in the country, with particular reference to earlier surveys and any apparent changes since they were done, as well as to recommend suitable methods of goitre control. Extensive goitre surveys were carried out (with particular emphasis on women 10 years and above) in various parts of Peninsular Malaysia (n = 4080), Sabah (n = 963) and Sarawak (n = 1741). Estimates were made of the household consumption of dried and fresh sea fish, as well as the use of salt in these houses.

**606. TOSHIO OGIHARA, KAZUYUKI OKI, YOSHIHIKO IIDA and SHIN-ICHI HAYASHI**

**Endemic goitre in Sarawak, Borneo Island; prevalence and pathogenesis**

*Endocrinology Japan*, 19 (3) : 285–293, 1972

A survey for endemic goitre was carried out on Iban natives (Sea Dayak) in four districts along the Rajang River in Sarawak, East Malaysia. Of the 608 subjects examined, the prevalence of goitre was found to be 8.1% among males and 33.2% for females. Twenty-four hour thyroidal  $^{131}\text{I}$ -uptake was  $54.3 \pm 13.1\%$  (mean  $\pm$  S.D.) in goitrous subjects, and  $47.1 \pm 10.2\%$  in non-goitrous subjects (no statistically significant difference). Urinary excretion of iodine was  $45 \pm 27$  ug per day in goitrous group and  $49 \pm 25$  ug in non-goitrous group (no statistically significant difference). Iodine content of drinking water was extremely low in all four districts, the lowest one being obtained from region in which the prevalence of goitre was highest. Thyroid parameters such as PBI, T<sub>3</sub> resin sponge uptake and cholesterol were all within normal limits. Anti-thyroid antibodies were not demonstrated in sera from either goitrous or non-goitrous subjects. KSCN discharge test was positive in two cases in a single family, among 33 cases studied. It was suggested that iodine deficiency was probably a major causative factor of endemic goitre in Sarawak. Other factors such as organification defect or defective thyroxine binding proteins might have some role in individual cases.

**607. G.F. MABERLY and C.J. EASTMAN**

**Endemic goitre in Sarawak, Malaysia : I. Somatic growth and aetiology**

*Southeast Asian Journal of Tropical Medicine and Public Health*, 7(3):434–442, 1976

A comparative epidemiological and anthropometric survey was conducted among Ibans, the largest indigenous ethnic group in Sarawak, in three regions where the endemicity of goitre exhibited marked differences, to assess the effect of endemic goitre on somatic growth. In the Ai river region, the prevalence of goitre was 99.5%, the majority being of grade 2. This was said to represent one of the highest incidences of endemic goitre in the world. At Rubu, the prevalence was 74%, the majority with grade 1 goitre. In the Bajong region, relatively few people were detected with goitre. Neurological cretinism was estimated at 3.6% in the severely goitrous Ai river population but was not detected in the other regions. Anthropometric data obtained from the three adult populations did not reveal any statistically significant differences in the following parameters : weight, height, weight/height ratio, height/sitting height ratios, head circumference, scapular skinfold thickness and left mid-arm muscle cir-

cumference. The haemoglobin, serum total protein and serum albumin concentrations were similar in the three populations. Dietary studies suggested that iodine deficiency was a significant contributory factor in the development of endemic goitre in Sarawak. This deficiency could be attributed to the leaching of iodine from the soil, and to the consumption of large quantities of cassava, a known goitrogen.

**608. G.F. MABERLY, C.J. EASTMAN and J.M. CORCORAN**

**Endemicity and consequences of goitre in Sarawak, Malaysia**

In: *Current Thyroid Problems in Southeast Asia and Oceania*; edited by B. Hetzel, M.J. Wellby and R. Hoschl; pp. 21–27, 1978

The paper reported further findings of the epidemiological and anthropometric survey carried out amongst Ibans in Sarawak (see abstract no. 607). The studies have suggested that at least two environmental factors were involved in the production of endemic goitre. Firstly, the low iodine content of drinking water in all regions was thought to have led to iodine deficiency in the inland regions. The low urinary iodine level in goitrous subjects before iodised oil injection was consistent with iodine deficiency. Secondly, in the coastal fringe of Rubu where the population depended more upon cassava rather than seafood for their staple diet a goitrogen was thought to be an important contributory factor in the development of endemic goitre of the Rubu population. The results of basal pituitary thyroid function tests obtained were said to be similar to that reported by other workers. The efficacy of parenterally administered iodised oil in reducing goitre size was clearly shown in an iodised oil programme.

**609. G.H. ALEXANDER**

**Endemic goitre and salt iodization in Sarawak, Malaysia**

*Assignment Report ICP / NUT / 001, MAA / NUT / 001, Regional Office for the Western Pacific, World Health Organization, 1979; 26 p.*

Recent surveys on the prevalence of goitre in Sarawak were reviewed. A high prevalence of goitre, in coastal as well as in inland areas, were reported. There was almost universal goitre (99.5%) in Lubok Antu, and 93.3% in the upper Lemanak River area, both in the 2nd Division. Statewide, visible goitres were found in 39% of all women examined, aged 15 years and above. It is caused primarily by lack of iodine, although a goitrogen could play a role in some areas. The various consequences of endemic goitre, including health and socio-economic aspects were discussed. With regard to prevention programmes, it was said that voluntary salt iodization in Sarawak had failed to significantly reduce the prevalence and prevent the development of endemic goitre in the State. It was thus recommended that there should be compulsory iodization of all salt used in the state.

#### 610. YAO SIK CHI

**A study of endemic goitre and the salt iodisation programme in Sarawak with special emphasis on the Pakan and Lubok Antu districts**

*Dissertation submitted to the University of Malaya in part fulfillment for the Degree of Master of Public Health, 1979; 130 p.*

The availability of iodised salt in 159 provision shops or village shops in the rural interior parts of Sarawak was studied. Where the iodised salt was not available, the reasons for the non-availability was determined. 234 Iban outpatients greater than 15 years old attending health facilities in Pakan and Lubok Antu were interviewed and examined for presence of goitre. The knowledge, attitudes and practices of some of the shopkeepers and natives regarding iodised salt was also studied. The author called for a renewed effort to popularise the consumption of iodised salt in rural interior regions of Sarawak. It was felt that legislation may be necessary to enforce the sale of iodised salt and to forbid the sale of raw untreated (white) salt in these areas. Iodised oil injection was also suggested as a prophylactic method in remote rural areas with high prevalence rates of endemic goitre.

#### 611. PAUL C.Y. CHEN

**Endemic goitre: a preventable and yet highly prevalent disease in Sarawak**

*The Medical Journal of Malaysia, 36(2) : 67–69, 1981*

In this Editorial, a brief review of the goitre problem in Sarawak is given. The prevalence of goitres among women 15 years and above, in most parts of this eastern state of Malaysia, varies from 40 to 50 percent. Iodine deficiency is said to be the main cause of this endemic goitre, and in most parts of Sarawak goitrogens only play a small and unimportant role. Although a voluntary salt iodization programme has been in existence in the state since 1957, it is said to be less than successful. It was suggested that the most effective single measure would be to legislate that all types of salts imported into Sarawak must be iodized. Bearing in mind the need to protect the 35,000 newborns added to the Sarawak population each year, urgent and adequate actions need to be taken.

#### 612. PAUL C.Y. CHEN and PEGGY, P.E. LIM

**The prevalence of endemic goitre in the Tinjar area, Sarawak**

*The Medical Journal of Malaysia, 37(3) : 265–269, 1982*

The prevalence of goitre was investigated in a sample from six longhouses and five primary school located at varying degrees of remoteness along the Tinjar river, Sarawak. The main ethnic groups in these communities were the Kenyak/Koyan and the Iban. A total of 286 males and 269 females aged five to fourteen years and 202 females aged fifteen years and above were examined. The overall prevalence of palpable goitre detected from the age group 5–14 years were 71.7% and 77.0% for males and females respectively, and 77.7% for females aged 15 years and above. The prevalence for both Iban and Kenyah/Kayan of either sex and for all age groups varied from 63.4 to 80.4%. The prevalence at each location did not differ significantly. A study was also made on the type of salt used by the households. The fact that 53.7%

of them used only uniodized coarse salt would imply that legislation on "table" salt iodization must be interpreted to mean not only the iodization of fine table salt, but in the case of rural longhouse communities, the iodization of coarse salt as well.

**613. G.F. MABERLY, K.V. WAITE, C.J. EASTMAN and J.M. CORCORAN**

**The role of cassava in endemic goitre in Sarawak, Malaysia**

*Abstract of the Second Asia & Oceania Throid Association Meeting, 19–22 August 1982, Tokyo, Japan; p. 35*

Cassava is a staple food in the Lubok Antu district of Sarawak Malaysia. In a village of 69 people all were judged clinically euthyroid and the prevalence (all ages) of goitre was 61%. Basal serum T<sub>3</sub> and T<sub>4</sub> concentrations were typical of endemic goitre. The mean urinary iodine concentration was consistent with iodine deficiency. A raised I/SCN ratio was also observed. High cassava consumption, with high SCN levels may account for some of their previous findings including a 70% prevalence of goitre in adults living by the sea. It may also account for the rapid depletion of iodine back to deficiency levels in less than 2 years following iodized oil injection, compared with 5–7 years in other regions.

**614. TAN YAW KWANG**

**Endemic goitre in the State of Sarawak, Malaysia**

*Proceeding of the Workshop on Cassava Toxicity and Thyroid : Research and Public Health Issues, 31 May – 2 June 1982, Ottawa, Canada; edited by F. Delange and R. Ahluwalia; pp. 64–68*

Based on the findings of various investigators in Sarawak, Malaysia, 12 of the State's 25 districts have been identified as goitrous, with varying rates of prevalence and occurring mainly in the inland areas. It was estimated that there were at least 20,000 cases of endemic goitre in the State, representing about 1.5% of its total population. The condition was caused primarily by insufficient iodine in the diet, whilst cassava consumption could be another contributory factor in some areas. These aspects of the prevalence and etiology of the endemic goitre problem in Sarawak were reviewed in this paper. Control programmes using iodized salt, and more recently using iodized oil injections and the utilisation of iodinator fitted into the existing gravity-fed village water supply were also discussed. The need for a clear understanding of this public health problem, its true magnitude, causes, and consequence was emphasized. It was envisaged that these lines of research would establish a long-term programme towards the effective treatment and prevention of endemic goitre and its associated problems in the country.

## NUTRITION AND DENTAL HEALTH

### 615. K.C. WOO

#### Water fluoridation in prevention of dental decay

*Berita Farmasi*, 4(7) : 26–27. 1977

The consistency of results obtained from different parts of the world has added strength and importance to the effectiveness of water fluoridation in the prevention of dental decay. Beneficial effects are particularly seen in children. When ingested, fluoride is able to increase the resistance of tooth to decay by being incorporated into the enamel which then become more resistant to acid attack. No side effects to properly controlled fluoridation of public water supplies have been substantiated. Water fluoridation in the country was first started in Johore Bahru in 1957. An evaluation study carried out in 1964 clearly showed the effectiveness of the programme. In 1973, the Cabinet approved recommendations for nation-wide fluoridation of public water supplies. At present, most major towns in Malaysia are served with fluoridated water. Other means of fluoride supplementation were also described, e.g. by using vitamin fluoride combination tablets, addition of fluoride to flour, milk, sugar and salt, local application of fluoride, and the use of fluoride-containing toothpastes.

### 616. G.L. KHOR

#### Does your child have a sweet tooth?

In : *For the Well-Being of Malaysian Children*; edited by Eleonora Sanders, Mary Tay and Zaitun Yassin; Universiti Pertanian Malaysia, 1979; pp. 46–48

Data are available which point to the adverse effect of carbohydrates, particularly sucrose, on dental caries. The more frequent the intake of sugar, especially in a highly retentive form like toffee and other types of candy and sweets, the greater is the caries activity. Since caries begins with the destruction of the inorganic enamel, developing teeth of children are specially liable to caries attack. Hence, cutting down on those “sticky” sweet food especially between meals is imperative, followed by regular check-ups by dentists.

### 617. ZAITUN YASSIN

#### “Nursing Bottle” syndrome

In : *For the Well-Being of Malaysian Children*; edited by Eleonora Sanders, Mary Tay and Zaitun Yassin; Universiti Pertanian Malaysia, 1979; pp. 41–45

“Nursing Bottle” syndrome or “bottle mouth” caries is a phenomenon seen in children between one to four years old who had prolonged bottle feeding. One of the main sources of the problem is the common practice of giving milk or fruit juice in feeding bottles at sleeping time, usually to quieten the child. At bedtime, the child swallows rather slowly and the flow of saliva is also reduced, so that much of the undiluted fluid tends to pool around the teeth. This stagnating of sweet fluids causes the decay mainly of the upper front teeth. Thus, to prevent the syndrome, it is necessary to avoid bottle feeding in bed. Parents should be made fully aware of the problem and the importance of dental care and hygiene.

## OVERNUTRITION AND ASSOCIATED DISORDERS

### 618. Y.H. CHONG

**Diet and coronary heart disease — current knowledge and new perspectives.**

*Paper presented at the IMR Scientific Session No. 38, 1 April 1981; 13 p. (mimeographed)*

Atherosclerotic plaques develop as a result of chemical or mechanical injury to the arterial wall and subsequent infiltration of platelets, platelet-derived factors and the atherogenic plasma lipoproteins. The cholesterol in atherogenic lipoproteins continually enters the endothelial cells and chronic hyperlipidemia itself, may initiate endothelial injury. The "protective" high density lipoproteins come into the picture here by clearing the trapped cholesterol in the endothelium to the liver for catabolism and excretion. Dietary factors, particularly dietary fats have a profound effect on atherogenesis by influencing the levels of the atherogenic plasma lipoproteins. They are also concerned in the coagulability of the blood by way of the biosynthesis of thromboxane and prostacyclin which possess the opposite effects of causing platelet aggregation and repelling platelet deposition respectively. Dietary manipulation to inhibit platelet aggregation by altering the ratio of prostacyclin to thromboxane is possible through consumption of marine fats rich in eicosapentenoic acid and by eating onions, garlic and the black tree fungus. The beneficial role of dietary fibre particularly the viscous gummy and gelling substances in fruits and vegetables in lowering plasma cholesterol is now known. Finally the discovery that the arterial wall may be damaged by excess of vitamin D and oxidised cholesterol found in deep fried foods are other new areas that may pave the way for a more effective dietary prevention of coronary heart disease.

### 619. TEE E SIONG

**Sugar and overnutrition**

*Paper presented at the Malaysian Dental Association Seminar on Sugar and Dental Health, 28 February 1981, Kuala Lumpur; 17 p. (mimeographed)*

World sugar consumption for 1970 has been estimated to be 57 g per capita per day (or 21 kg per person per year). In some of the wealthier countries, a staggering figure of 164 g per capita per day (or 60 kg per person per year), making up 27% of the total daily calorie intake, has been estimated. Malaysians, with a per capita daily intake of 86 g (or 31 kg per capita per year) is fast catching up with these countries. In most countries, this increase in sugar consumption has taken place at the expense of other foods rich in essential nutrients. Besides the resulting inevitable hazard of nutritional deficiency, a high consumption of sugar has been known to be a contributory factor in the causation of several diseases, the so-called diseases of affluence, such as dental caries, obesity, coronary heart disease and diabetes. It is therefore of utmost importance that measures be taken to check the upward trend in sugar consumption. Public awareness of the inherent danger of overconsumption of sugar has to be constantly instilled.

**620. Y.H. CHONG, T.K.W. NG and H.E. OOI**

**High density lipoprotein-cholesterol levels and their application in assessing coronary heart disease risk in Malaysia**

*ASEAN Journal of Clinical Science*, 3(1):96–99. 1982

Patients with clinical coronary heart disease (CHD), even those whose plasma cholesterol and triglyceride concentrations were similar to those of healthy people, have been shown to have significantly lower amounts of HDL-cholesterol (HDL-chol). Prospective studies have also shown a strong negative correlation between HDL-chol and the development of new clinical CHD. It is thought that HDL-chol is a more powerful predictor of future CHD than either plasma cholesterol or triglyceride levels. This paper reports on the serum levels of HDL-chol in healthy Malaysian men and compares these with male patients having a clinical history of CHD or diabetes mellitus. It was observed that CHD patients (n= 350) had significantly lower HDL-chol and lower % HDL-chol than healthy subjects of similar mean age (n=190), even when the mean serum cholesterol and triglyceride levels of CHD patients were no higher than the mean levels of the age-matched healthy group. Diabetics (n= 100) also had significantly lower HDL-chol and % HDL-chol than the healthy subjects. It was suggested that a serum lipid profile should include determinations of serum cholesterol, fasting triglycerides and HDL-chol in order that risk to the development of CHD could be better assessed.

**621. Y.H. CHONG and T.K.W. NG**

**Association of obesity with serum lipid and lipoprotein levels**

*ASEAN Journal of Clinical Science*, (in press)

Observations on the association between obesity with serum lipids and lipoproteins in a group of male adult Malaysians were reported. Subjects of the study were 502 male adults, comprising of 157 soldiers, 183 urban dwellers and 162 rural dwellers. Significantly higher levels of cholesterol and triglyceride were observed amongst obese subjects (determined using the body mass index) compared to non-obese subjects. A significantly lower level of % HDL-cholesterol was also obtained for the obese. There was however no significant difference in the mean ages of the two groups. In view of the fact that obesity, raised levels of total cholesterol, triglycerides and LDL-cholesterol are known risk factors and HDL-cholesterol and % HDL-cholesterol are indices of protection to coronary heart disease, it was felt that findings from this study would have public health significance to Malaysians. Weight reduction in the obese would thus be expected to reduce the risk due to hyperlipidaemia and to favourably modify the distribution of cholesterol between LDL and HDL.

## **NUTRIENTS IN FOODS**

**622. STANTON, W.R.**

**The chemical composition of some tropical food plants: VI. Durian**

*Tropical Science*, 8(1) : 6–10, 1966

The durian (*Durian zibethinus* Murr. and related species) is the most important



indigenous fruit of the South-east Asian archipelago, where it is highly valued. Its fame had spread elsewhere; this was mainly due to its odour, which many travellers regarded as revolting. Others become addicted to the fruit. The paper discussed the proximate composition, minerals and vitamin contents of durian. The presence of indoles derivatives, which may be responsible for the odour of the fruit, was also discussed. The seed was said to be eaten, but has been known to be indigestible. This was thought to be due to cyclopropenoid fatty acids, mainly sterculic acid, commonly found in allied genera.

#### 623. LATIFF RASULPURI, KHOR GEOK LIN and A. SEDKY

##### Development of nutritious foods. 1. A fish-based protein food supplement

*Report No. 82, Agricultural Product Utilisation Division, MARDI, Serdang, 1972; 15 p.*

Since rice is the staple cereal in the country and fish is consumed gladly whenever families can afford it, a rice-fish supplemental food mixture that could fit the diet pattern of a large section of the multiracial population was developed. Various combinations of rice and fish, and various processes for preparing the food supplement were tried out. Results of reconstitution studies of the product were discussed. The nutrient content of the products were also monitored. The preliminary work carried out was said to give encouraging results. Further work on this was suggested, e.g. determination of the amino acid composition and biological availability, the acceptability of the food supplement, its packaging requirements, and shelf-life. The supplementary food would also have to be fortified with vitamins and minerals to provide for the recommended levels of intake of these nutrients. Such a food supplement could meet the requirements of a weaning food, as well as for use in preschool and primary school feeding programmes. With proper Government encouragement, it would be possible to produce this on a commercial scale.

#### 624. QUAH SOON CHEANG and P.K. MOHAN RAO

##### Protein variability in Malayan varieties of rice (*Oryza sativa* L.)

*Malaysian Journal of Science*, 1(A) : 35–43, 1972

The protein content of fifty-nine varieties of rice cultivated in West Malaysia were found to lie in the range of 5.22 to 11.41 percent, with an overall mean of 8.41 percent. Protein contents of three popular Malayan varieties of rice, i.e. Bahagia, Mahsuri and Ria, grown at different locations in the country, varied considerably from location to location. This variation in protein content was however not large enough for the overall location effect to be statistically significant. Nitrogen fertilization at high dosage (70 lbs per acre and above) significantly increased the protein content of most of the varieties of rice studied. The varieties varied in their responses to nitrogen fertilization with respect to protein accumulation in the grains. Significant varietal (genotypic) differences were found with respect to protein content in the Malayan varieties of rice studied. It was thus concluded that protein content of rice varieties could be improved by (i) the application of the proper level of nitrogen fertilizer,

and (ii) the selection of suitable varieties of rice which have a significant response to nitrogen fertilization. It was felt that any increase in the protein content of rice would greatly improve the diet of many Asians.

**625. MOHD. HASHIM HASSAN, ADELINE LIM and SALMAH YUSOF**

**Development of low-cost, ready-to-serve, convenient food for supplementary feeding of school children**

*Report No. 129, Food Technology Division, MARDI, Serdang, 1974; 12 p.*

Various studies for the production and development of fortified, nutritious, ready-to-serve foods were reported. All foods designed or formulated for school feeding will be conveniently rehydratable and will not involve the usual kitchen chores and utensils. One of the main objectives was to base the formulated foods on the Malaysian palate with least modification of food habits. Other factors considered were the cost, storage, acceptability, and preparation time. Various types of biscuits/cookies, instant dehydrated porridges and easily reconstitutable soups that were developed were discussed. The nutritive value of the products was considered in developing the products. The problems encountered during the studies were pointed out.

**626. KHOR GEOK LIN**

**Mushrooms as food**

*Proceedings of the Conference on Malaysian Food Self-Sufficiency, 21–23 August 1975, Petaling Jaya; edited by B.T. Tan, F.S.C.P. Kalpage, G.C. Ch'ng, S.T. Cheam and K.C. Wong; pp. 83–96*

Mushrooms have long been considered a delicacy in people's diets. In Malaysia, the great demand for mushrooms is demonstrated by large imports, e.g. over 3 million dollars of worth of dried Shiitake (*L. edodes*), and over 2 million dollars of canned *A. bisporus* and *V. volvacea* (respectively the button and straw mushrooms) were imported in 1973. Although these have been eaten almost entirely for their condimental value, mushrooms do possess certain food values. Crude protein contents, biological values and amino acid compositions of the mushrooms are said to fall between that of vegetable and animal proteins. These are also important sources of minerals and vitamins. The methods of cultivation of the button and straw mushrooms were also discussed in some detail. It was felt that the local cultivation of these mushrooms should be encouraged to assist in reducing their import.

**627. WONG KAI CHOO**

**The potential for four-angled bean (*Psophocarpus tetragonolobus* (L.) DC.) in Malaysia to increase food supply**

*Proceedings of the Conference on Malaysian Food Self-Sufficiency, 21–23 August 1975, Petaling Jaya; edited by B.T. Tan, F.S.C.P. Kalpage, G.C. Ch'ng, S.T. Cheam and K.C. Wong; pp. 103–115*

Four-angled bean or winged bean (*Psophocarpus tetragonolobus*), known locally as "kacang botor", has been recorded in Peninsular Malaysia as early as the 18th cen-

tury. Up to today, it is mainly cultivated in the form of a few plants grown for consumption of young green pods as a domestic vegetable. Though early records from this country as well as from neighbouring countries have recognized the potential uses and favourable composition of the seeds, pods, leaves and tubers of the plant, very little attempt has been made to exploit them. Analyses and preliminary feeding studies undertaken have shown that the seeds of this legume compare favourably to that of soyabean in composition, nutritional value and possibly every aspect of utilization. The tubers show a rare and potentially useful combination of high carbohydrate and high protein contents. Amino acid composition of the tuber is found to be superior to that of tapioca, a widely-used root crop in this country. Yield performance of a presumably homogenous local used material of this species is superior to other legumes in this country and to the same species in other countries. This species has also been found to nodulate heavily and effectively under local conditions. The latter characteristics coupled with an outstanding high nutritional content in the various plant parts, all of which can be used by man to feed himself or his animals, cannot be overlooked in the battle for increased food production.

**628. G.L. KHOR, J.C. ALEXANDER, J. SANTOS-NUNEZ, A.E. READE and K.F. GREGORY**

**Nutritive value of thermotolerant fungi grown on cassava\***

*J Inst Can Sci Technol Alimen* 9(3):139–143, 1976

Current interest in the utilization of microorganisms as a source of dietary protein arises from two main considerations : (a) the critical need for food, particularly protein, for the world's growing population, and (b) the realization that microorganisms can synthesize protein from substrates such as hydrocarbons and carbohydrates extremely rapidly. Three strains of *Aspergillus fumigatus*, one strain of *Sporotrichum thermophile*, and one strain of *Paecilomyces* sp., (all filamentous fungi) were grown on media based on cassava carbohydrate, or whole cassava, and evaluated for their nutritional quality. Determination of the amino acid content of the microbial proteins by ion-exchange chromatography after acid hydrolysis showed that they were low in sulphur amino acids. Biological evaluations of these proteins were also carried out based on protein efficiency ratio (PER) and net protein ratio (NPR). It was found that rats fed with fungi supplemented with methionine produced significantly higher PER and NPR values, as well as better weight gains than when unsupplemented.

\* See abstract no. 738 for safety evaluation of these preteins

**629. OTHMAN HASSAN**

**Weaning food in Malaysia**

*Paper presented at the Seminar on Weaning Food at the 5th Meeting of the Scientific Cooperation of Asia(ASCA), Bangkok, Thailand. Also in : Report No. 140, Agricultural Production Utilisation Division, MARDI, Serdang, 1976; 9 p.*

A basic problem in infant feeding in Malaysia is to develop commercially a nutritious 'weaning food' based on locally available raw materials, to be used during the period

between the time a baby receives adequate nourishment on breast milk alone, and the time when he is receiving a fair share of the full range of the adult diet. There was no work as yet on weaning food proper. However, the Division was in the process for developing several low cost high protein foods designed or formulated especially for school feeding (see abstract no. 625). All these foods were said to be able to be modified for use as weaning foods.

#### 630. SHAHARUDDIN AZIZ

Food components in the edible portion of the *Anadara granosa* Linn

*Journal of Medical and Health Laboratory Technology Malaysia*, 3(1):15–17, 1976

*Anadara granosa* L., or better known as the cockles or *kerang*, is a popular seafood and is acceptable to all races in Malaysia. Some essential trace elements of the cockles, namely Zn, Cu, Cr, Mn, Mo, Co, Fe, Ni, Mg and K, as well as the protein, fat and carbohydrate contents were determined. The trace elements were determined by atomic absorption spectrophotometric method. Results obtained showed that the cockles could be a relatively cheaper source of protein and the essential trace elements.

#### 631. SHIV K. BERRY

Characteristics of the seed oil of four-angled bean (*Psophocarpus tetragonolobus* (L) D.C.)

*Malay. Appl. Biol.*, 6(1):33–38, 1977

The oil from the local four-angled bean (*P. tetragonolobus*) was examined for its refractive index, iodine value, acid value, saponification number, unsaponifiable matter and fatty acid composition. The values for fatty acid as methyl esters were myristic 0.15%, palmitic 8.40%, palmitoleic 0.54%, stearic 5.77%, oleic 33.8%, linoleic 32.79%, linolenic plus arachidic 2.75%, eicosaenoic 2.80%, behenic 10.85%, docosaenoic 0.47%, and lignoceric 1.61%. The occurrence of the last four named fatty acids were reported for the first time. The oil was said to resemble, in many respects, that of soya bean and could be substituted for it as edible oil.

#### 632. R.A. BUCHANAN

Protein-rich foods in South-east Asia

*Malaysian Institute of Food Technology Bulletin*, 2:24–34, 1977

Protein-calorie malnutrition in childhood, often accompanied by vitamin and mineral deficiencies, remains one of the most serious public health problems in South-east Asia. The other nutritionally vulnerable groups are the pregnant and nursing mothers and primary school children. These vulnerable groups are the ones that governments generally have in mind when they are formulating long-term assisted feeding programmes, as well as other intervention measures. Changes in lifestyles, particularly industrialisation, urbanisation and early weaning practices have created new situations where new solutions are required. In the developing countries, there is therefore undoubtedly a need for “new” foods to be developed to combat these nutritional problems. The major approaches which have been used in the development of “new” products

may be grouped as : fortification of staple foods, supplementation of prepared foods, weaning foods, snack foods, imitation foods, new recipes for household use, extenders and beverages. The paper discussed briefly each of these approaches, and dealt with the development of weaning foods in greater detail.

### **633. CH'NG GUAN CHOO and IBRAHIM HAJI AHMAD**

#### **Nutritive value and utilisation of Malaysian fruits**

In : *Fruit Cultivation in Malaysia*, edited by Othman Yaacob, Universiti Pertanian Malaysia, 1977; chapter 9, 21 p.

Being a tropical country with ample rainfall and sunshine, Malaysia has abundant varieties of fruits. Generally, Malaysian fruits can be classified into the seasonal and the non-seasonal. Although most of the popular fruits such as durian, mangosteens and rambutan are seasonal, there are many others that are available all the year round. Even the seasonal fruits overlap one another so that a constant supply of varieties of fruit throughout the year is assured. This chapter first dealt with the nutritive value of local fruits. Other aspects included in this section were demand in relation to imported fruits, price, improvement of yield and quality. The remainder of the chapter discussed the utilisation of local fruits, which included the processing and preservation of fruits using traditional and modern methods.

### **634. KHOR GEOK LIN**

#### **Mushroom mycelia as a protein supplement**

*Proceedings of the Conference on Food and Agriculture Malaysia 2000, July 1977, Serdang*; edited by H.F. Chin, I.C. Enoch and Wan Mohamad Othman; pp. 347–357

With the current high population growth rate and limited available land for cultivation, the development of food production processes independent of land use is becoming imperative. Processes which have attracted research interest include those in which yeast or fungi are used to manufacture edible protein from the aerobic fermentation of various substrates such as cannery wastes and cheap carbohydrate sources. The paper describes the production of mushroom mycelia in a submerged culture. The process is said to have many advantages over the traditional method of cultivating mushrooms, especially the rapid rate of production and the use of waste materials as substrates. Like other fermentation processes, the initial cost for the plant and equipment are high, but production could become economically competitive for large-scale operation. As a component of the diet, mushrooms have often been regarded only for their culinary properties. However, attention is being paid to the possibility of their use in a more important role, namely as a source of protein supplement. It is said to be intermediate in quality between vegetable and animal protein. On a dry weight basis, it compares favourably in quantity with even the animal protein. However, being limited in certain amino acids, mushroom mycelia cannot be substituted for animal protein, but definitely possesses enough nutritional value to be a protein supplement.

**635. LEE PEH LAN, LIM PHAIK EE and J.D. OWENS**

**Protein contents of some Malaysian fresh and preserved seafoods**

*Malaysian Institute of Food Technology Bulletin*, 2:1–7, 1977

Protein content was determined in a number of Malaysian fish, shell fish and preserved seafood products. In addition, some samples of soybean milk were also analysed. Results obtained showed that dried seafood products (dried, salted fish/prawn) and prawn pastes (*belacan* and *heko*) were among the most concentrated protein sources commonly available. These are relatively inexpensive and hence offer cheap sources of animal protein. Some of the preserved foods however exhibited wide differences in composition between different manufacturers. It was suggested that quality standards should be defined for these foods.

**636. LEE TAK LIM**

**Soya sauce manufacture and the consumer**

*Malaysian Institute of Food Technology Bulletin (Symposium supplement)*, pp. 17–21, 1977

Soya sauce may be classified into three types, viz, *Koikuchi*, *Usukuchi*, and *Tamari*. The last named is also known as the Chinese type, and is the common one produced in Malaysia. The paper described the manufacturing process for soya sauce. Recent developments in the production of soya sauce, currently produced by the traditional mould and fermentation process, were briefly discussed. Some discussion was also devoted to the types and quality of soya sauce.

**637. LIM CHIN LAM**

**The manufacture of soya sauce in West Malaysia**

*Malaysian Institute of Food Technology Bulletin (Symposium supplement)*, pp. 3–16, 1977

In Malaysia, the Chinese distinguish two types of soya sauce viz, a thin variety called *pak yau* and a thick variety called *hak yau*. The paper discussed the soya sauce industry in the country, and described the manufacturing processes for the two types of soya sauce. The chemical compositions of these sauces were also described. Other aspects dealt with included the importance of the sauce in human nutrition, the microbiological aspects, shelf-life of the product, the need for standardisation, and outlook of the industry in the country.

**638. MOHD. HASHIM HASSAN, AHMAD ZAHARUDIN IDRUS and ADELENE LIM**

**Production of low cost high protein food in Malaysia**

*Report No. 131, Agricultural Product Utilisation Division, MARDI, Serdang, 1977; 15 p.*

This is an extension of the previous report (abstract no. 625), where research studies into the development of nutritious foods utilizing locally available resources were reported. One of the main objectives was to base the formulated foods for Malaysian

palate with the least modification of food habits. The products developed were sensory evaluated by members of the staff of the Division and school children. Products which were found to be sound were produced in larger quantities and distributed to the child care centres and the Maternal and Child Health Clinic for acceptability trials. Accepted products would then have to be given to the private sector for commercial production. The report tabulated the various products developed, their ingredients, cost and nutritional value.

#### **639. YEOH QUEE LAN and ZAHARA MERICAN**

##### **Selected fermented foods of Malaysia – 1**

*Report No. 154, Agricultural Product Utilisation Division, MARDI, Serdang, 1977; 20 p.*

The various types of fermented foods found in Malaysia are usually indigenous to a particular ethnic group in the country. Some have been introduced and have become accepted by the other races as part of their diet. Others have only limited appeal and are consumed by people of a particular ethnic group or locality only. On the other hand, there is also available a wide range of fermented foods of European origin, ranging from beer and cheese to cocoa and tea, which are now widely consumed and produced in the country. The paper described in general the various fermented foods available in the country under several broad classes, namely (i) the alcoholic beverages, such as beer, fruit wine, *toddy*, *samsu*, etc., (ii) starters, for example *ragi tapai*, *ragi samsu*, *ragi roti*, etc., (iii) condiments, e.g. *kicap*, *tauchu*, *blacan*, *budu*, *cincajuk*, etc., (iv) other fermented foods, such as *tempeh*, *jeruk*, *taire*, *tapai pulut* and *tapai ubi*, *apam*, etc., and (v) various beverages, such as cocoa, tea, and coffee. Topics discussed include methods of production, characteristics and chemical composition.

#### **640. YEOH QUEE LAN and ZAHARA MERICAN**

##### **Selected fermented foods of Malaysia – II**

*Report No. 158, Agricultural Product Utilisation Division MARDI, Serdang, 1977; 95 p.*

Second in the series of two reports on some fermented foods in Malaysia, this report dealt with *blacan*, *budu*, fruit wine vinegar, pickles, *ragi*, soy sauce, *tapai*, *tempeh*, *tempoyak* and *toddy* individually. The various aspects discussed included the method (s) of preparation, chemical and nutritional composition, microbiological aspects, and the importance of these foods in human nutrition.

#### **641. ZAHARA MERICAN and AISHAH AZIZ**

##### **Research trends in soya sauce manufacture**

Malaysian Institute of Food Technology Bulletin (Symposium *supplement*), pp. 27–44, 1977

Results of microbiological, chemical and nutritional studies on Malaysian soya sauces were presented in the paper. The experimental procedure followed was essentially that of the traditional Chinese type fermentation method. Results from other

researchers were also presented to show resemblances. The author called on the Malaysian manufacturers to change their outlook and adopt a more modern approach in order to set a good uniform standard for our soya sauce.

#### 642. ZANARIAH JIMAN

##### Metabolic evaluation of protein food: a country report

*Paper presented at the 1st ASEAN Workshop on Metabolic Evaluation, 22–28 August 1977, Bangkok, Thailand; 5 p. (mimeographed)*

Newly developed products, especially protein foods or high protein products need to be assessed for their quality and those products from unconventional protein sources need to be assessed for their safety to ensure that they are not hazardous to health. The mere chemical determination of the proximate analysis of food will not reveal very much the protein quality of these products, nor will it reveal the toxicity of the products if present. Hence animal assays or metabolic evaluations have to be carried out to ensure that the product is of good quality and not toxic for human consumption. The report described briefly some of such evaluations in the country, mainly Protein Efficiency Ratio (PER) and Net Protein Utilization (NPU).

#### 643. SHIV K. BERRY

##### The composition of the oil of starfruit (*Averrhoa carambola*, Linn.) seeds

*American Oil Chemists Society Journal*, 55:340–341, 1978

The starfruit (*Averrhoa carambola*, Linn.) seeds were found to be rich in oil. The oil was examined for its refractive index, iodine value, acid value, saponification number, unsaponifiable matter, and fatty acid composition by gas liquid chromatography. The percentages of fatty acids (as their methyl esters) were C14:0 (0.67%), C16:0 (21.34%), C18:0 (8.15%), C18:1 (45.83%), C18:2 (22.33%), C18:3 plus C20:0 (1.14%); C20:1 (0.28%); C22:0 (0.26%) and C24:0 (trace)

#### 644. H.T. KHOR and RAYMOND C.C. YAP

##### Fatty acid composition of some Malaysian fruits

*Malaysian Journal of Science*, 5(A):75–78, 1978

The lipid contents and fatty acid composition of ten Malaysian fruits, namely, papaya (*Carica papaya*), passion fruit (*Passiflora lauriflora*), soursop (*Annona muricata*), chempedak (*Artocarpus integer*), chiku (*Manilkara zapota*), great hog plum (*Spondias cytherea*), horse mango (*Manilkara foetida*), durian (*Durio zibethinus*), rambutan (*Nephelium lappaceum*) and mangosteen (*Garcinia mangostana*) were analysed. Results obtained show that the above fruits have lipid contents of 0.19%, 0.46%, 0.91%, 1.01%, 1.08%, 0.11%, 0.59%, 5.04%, 0.20% and 0.72% respectively. The fatty acid composition of the fruits as determined by gas-liquid chromatography was found to vary in the pattern of distribution, both qualitatively and quantitatively. However, all the fruits have larger proportions of unsaturated than saturated fatty acids. Palmitic acid (16:0) is the major saturated fatty acid but there is no consistent pattern in the



distribution of unsaturated fatty acids in the fruits studied. Oleic acid (18:1) constitutes the largest proportion of unsaturated fatty acid in durian, rambutan and mangosteen, but in the other fruits, either linoleic acid (18:2), linolenic acid (18:3) or eicosadienoic acid (20:2) is the major unsaturated fatty acid.

#### **645. MOHD. HASHIM HASSAN and HUSSIN HJ. ZAKARIA**

##### **Expanding the use of soya beans in Malaysia**

*Report No. 155, Agricultural Product Utilisation Division, MARDI, Serdang, 1978; 36 p.*

The paper discussed the present conditions of the soya bean industry in Malaysia, the manner in which soya bean can be utilized, the establishment of a small scale processing plant in a rural community and the future long term programmes to increase the use of soya bean in the country. Though soya bean has been cultivated in Malaysia for many years, cultivation of this crop has never been significant. The country has thus always been a net importer of soya bean and soya products viz: flour, oil, sauce and cake. Soya beans, soya flour, sauce and oil are imported for food purposes, while soya bean cake is for livestock feed formulation. Imported whole soya beans are further processed into edible items such as *tofu*, *fuchok*, *tempeh* and are also incorporated into other products such as *mee* or noodles. A substantial amount is processed into sauce and paste while a major portion is converted into cake and meal for animal feed formulation. The manufacture of some of these products in the country were described. The imported soya flour were for the production of high protein beverage, high protein bakery products, processed meat/meat substitute, textured vegetable products, weaning foods, and various snack food items. The future long term programmes to increase the use of soya bean in the country were discussed.

#### **646. MOHD. NORDIN MOHD. SOM and MOHD. HASHIM HASSAN**

##### **Preliminary study on the utilization of nangka seed as snack food**

*Report No. 172, Agricultural Product Utilisation Division. MARDI, Serdang, 1978; 12 p.*

The objective of the study was to examine the utilisation of the *nangka* seed for the production of crispy snack products. Its success would probably enable fruit industries involved in the canning of jackfruit to diversify its products. The preparation of flour from the *nangka* seed and the usage of this for blending with tapioca flour in the production of *nangka* crisps were described. The expansibility of the crisps upon frying was also studied. It was suggested that more fundamental work on identifying the properties of the *nangka* seed flour, dough strength and using different blends of flour have to be experimented in order to get a better and tastier crisp.

#### **647. YEOH QUEE LAN**

##### **Utilisation of by products for the production of food and feed**

*Report No. 161, Agricultural Product Utilisation Division, MARDI, Serdang, 1978; 71 p.*

Large amounts of 'waste' or 'by-products' are generated during the processing of the

harvested food crops. A wide variety of food and feed can be produced from this portion of the harvest and may be utilised to meet the growing demand for food. Some examples of such waste utilisation were discussed in the paper. In the rubber, oil palm, cocoa, pineapple canning, sugar cane, tapioca starch and coconut industries, studies have been undertaken for the utilisation of the different wastes generated. In the fish industry, a high proportion of the fish caught is classed as trash fish. Some of these have been converted to fish meal and fertilizers. Some of the better quality non-commercial fish has been converted to *budu*, dried and salted, or to fish balls, fish fingers, fish sausage and fish crackers. The production of *tempeh* and a variety of *tempeh*-like foods through fermentation has also been carried out from substrates normally regarded as wastes. The production of single cell protein, mainly for the feed industry, from waste effluents was also described.

#### 648. YU SWEE YEAN and CH' NG GUAN CHOO

##### Soy bean foods in Malaysia

*Proceedings of the International Soya Protein Food Conference, 25–27 Jan 1978, Singapore; pp. 48–52*

Some 14 types of traditional soya bean foods that are manufactured in Malaysia were discussed in the paper. These were divided into two classes: fermented and non-fermented. In the former class were soya sauce, *tempeh*, *tau-cheo*, and *tao-si*. The non-fermented soya bean foods discussed were soya bean sprouts, *tofu* (semi-firm curd), *tofu-fah* (soft curd), *tow-kwa* (firm curd), *tim-chok* (dried, flat sheets), *fu-chok* (dried, rope-like), *tofu-pok* (deep-fried curd), *chak-tie* (vegetarian sausage), soya bean milk (*tau-cheong*) and meat analogues. The manufacturing process of these products, their food usage, and some aspects of their nutritive value were discussed. Most of these soya foods have been consumed for their organoleptic appeal, especially when cooked in combination with other foods, and also due to traditional and religious implications, rather than solely for their nutritional content. More importantly, they are relatively cheap, there are no religious taboos associated with their consumption, and they are acceptable to all communities.

#### 649. ZANARIAH JIMAN

##### Effects of processing on nutritional values of food

*Report No. 170, Agricultural Product Utilisation Division, MARDI, Serdang, 1978; 34 p.*

There are two basic principles in food processing. The first is to make food more digestible or palatable through refinement (e.g. the milling of cereal grains), the other is the protection of food from decay or deterioration by arresting natural changes within the food itself or by controlling sources of contamination (e.g. by drying, canning, freezing, or addition of preservatives). These processes however also lead to inevitable changes to nutrients such as proteins, fats, carbohydrates, vitamins and minerals, which may involve either destruction or changes in availability or biological properties. These changes were discussed in relation to different processing methods. Due to the losses that may occur with processing, certain nutrients are required by law to be restored, or additional amounts added. The effect of home preparation and storage of foods were also briefly discussed.

#### **650. R. ALAGARATNAM**

##### **Single Cell Protein**

*Proceedings of the Symposium on Protein Rich Food in ASEAN, Kuala Lumpur, 12–13 July, 1979; edited by Zahara Merican, Q.L. Yeoh, S.K. Berry, E.C. Chuah and G.C. Ch'ng; pp. 114–117*

The production of single cell protein (SCP) or microbial protein has been advocated as a means of supplementing our supply of food (and feed). The production of SCP involves the growth of microorganisms on a carbon substrate supplemented with a nitrogen source and other necessary nutrients in a simple aerobic fermentation system. The protein in the harvested microbial cells may then be extracted and textured into a food for humans, although a more immediate possibility would be to feed proteins so obtained to animals to shorten the food chain. This method of protein production will not be competing with traditional agriculture for our limited land resources. The rapid growth rates of microorganisms and our ability to control fermentation as industrial processes are some of the other advantages. Despite the vast amount of literature published on SCP production, only a few of these processes have gained commercial acceptance which will only come about when such processes can demonstrate an economic advantage over traditional protein production.

#### **651. CHIA JOO SUAN, ZAHARA MERICAN and NOOR REHAN ABDULLAH**

##### **Spectrophotometric analysis of benzoic acid and study of the composition of soy sauce produced in Malaysia**

*Report No. 215, Agricultural Product Utilisation Division, MARDI, Serdang, 1979; 19 p.*

The objective of the paper was to study the composition, including benzoic acid content, of various grades of soy sauce available in the local market. Eighty six sample of soy sauce were obtained for the study. The report tabulated the pH values, ash, protein, sodium chloride, total solids, total sugars and benzoic acid contents of the samples. The relationship between the components of the sauces was also examined.

#### **652. LO CHEE KAH**

##### **Canned protein food**

*Proceeding of the Symposium on Protein Rich Food in ASEAN, Kuala Lumpur, 12–13 July, 1979; edited by Zahara Merican, Q.L. Yeoh. S.K. Berry, E.C. Chuah and G.C. Ch'ng; pp. 103–105*

Canned protein foods may be divided into animal, seafood and vegetable (plant) sources. The types of these foods that are commonly found in the Malaysian market were discussed. Protein content of these foods were tabulated and compared with their retail prices. The rest of the paper dealt with the need for consumer education with regard to the types of foods to buy. In our countries, consumers are said to be not nutrition conscious, and the choice of food is based on many non-nutritional factors such as taste, appearance, colour, status, etc. The need for well planned and regular health/nutrition education programmes by responsible and competent Government agencies in conjunction with consumers' associations was emphasized so as to correct existing misconception on the choice of foods. The author also called for the enforcement of proper labelling of food products.

**653. T.P. LOW and LEE KHENG HOON**

**Essential trace metals in Malaysian finfish and shellfish : Vanadium, chromium, manganese and molybdenum**

*Proceedings of the Conference on Chemical Research in Malaysia, 19–21 March 1979, Kuala Lumpur*; edited by S.E. Loke, Mohinder Singh and B.K. Ong; pp. 127–133

The study of the essential trace metals vanadium chromium, manganese and molybdenum in 22 species of Malaysian finfish and shellfish was reported. Vanadium and molybdenum were determined spectrophotometrically using 4-(2-pyridylazo) – resorcinol (PAR) as the chelating agent, whilst chromium and manganese were estimated by atomic absorption spectroscopy of the metal chelates of diethyl dithiocarbamate extracted into methyl isobutyl ketone. Chromium was found in low trace level at 0.01 to 0.05 ppm whereas vanadium, manganese and molybdenum were present in more significant levels at 0.23 – 3.88, 0.12 – 3.50, and 0.40 – 3.58 ppm wet weight, respectively. The role played by these essential trace metals in their various functions as metallo-enzymes and metal-activated enzymes in human health is briefly discussed.

**654. MOHAMAD ISHAK DJAFAR**

**Processing leaf protein concentrate and its importance for human welfare**

*Proceedings of the Symposium on Protein Rich Food in ASEAN, Kuala Lumpur, 12–13 July, 1979*; edited by Zahara Merican, Q.L. Yeoh, S.K. Berry, E.C. Chuah and G.C. Ch.ng; pp. 126–131

It is felt that the protein problem in the world should be solved through the interest on the conversion of vegetable or other forage plant protein into more desirable forms of leaf protein concentrate (LPC). About two-thirds of the world's agricultural land is planted with herbage. Today, most of the grasslands are used for grazing livestock and the savannah type of grassland for game animals. It is well known that only 10 to 30% of the plant protein can be converted into animal protein, whereas 40 to 75% of the plant protein can be extracted from the forages. A major part of this LPC would be as substitutes to replace soyabean, groundnut or fish protein in compounding animal feed concentrates so that these sources can then be available for human consumption, especially in developing populated countries. With increased interest in new sources of high quality low cost protein, efforts have been made to develop LPC for direct human consumption. The success of LPC production depends on human attitudes. Socio-educational measures should thus be employed to change the habits of people to accepting these new products. Besides the possible uses of LPC, the paper also dealt with some agronomic aspects of grasses and legumes, as well as the methods of processing LPC.

**655. MOHD ISMAIL NOOR**

**Fermented foods in Malaysia**

*Paper presented at the UNU Workshop on Research and Development Needs in the Field of Fermented Foods, 14–15 December 1979, Bogor, Indonesia*; 5 p. (mimeographed)

The paper gave a brief review of the types of fermented foods in Malaysia. Current work on fermented foods, and the problems faced by the fermented food industries

were discussed. It was felt that there was a need towards a better understanding of the role of fermented foods in the country in relation to its production, market viability, the contribution towards better nutrition, acceptability and health hazard.

**656. MOHD ISMAIL NOOR and J.F. MEDRANO**

*Tribolium castaneum* as a bioassay organism in asseing protein quality of food

*Paper presented at the Conference on Trends in Applied Biology in Southeast Asia, 11–14 October 1979, Penang; 17 p. (mimeographed)*

The use of *Tribolium castaneum* as a bioassay organism to evaluate the manner in which protein quality of mung bean (*Phaseolus aureus*) was improved or otherwise affected during germination and cooking process was investigated. *Tribolium* larvae were reared from 8 to 24 days of age in diets made up of cooked ungerminated and germinated mung bean at two and four days old to provide 0, 2, 4 and 6% protein in the diet. Different metamorphic forms at the developmental stages were assessed by counting at 18, 20, 22 and 24 days of age. The results obtained on larval weight gains recorded at 10–14 days of age and the different metamorphic stages observed indicated that there was a decrease in protein quality as a result of germination and cooking process. The study also indicated the potential of using *Tribolim castaneum* as a bioassay organism in assessing protein quality of Foods.

**657. NORMAH HASHIM and MARION L. FIELDS**

Vitamin B, relative nutritive value and palatability of germinated corn (*Zae mays* L.)

*Pertanika*, 2(2):128–132, 1979

Corn is a staple of many countries in the world. The nutritive value of corn is not complete since it lacks certain essentail amino acids, minerals and vitamins. A simple way to improve its nutritional quality is by germination. In this study, it was shown that there was significant increase of niacin and riboflavin in germinated corn compared to that of the control corn meal. No change in thiamin content was noted. The Relative Nutritive Value (RNV) of the germinated corn meal, determind using *Tetrahymena pyriformis*, was also significantly higher than that from the ungerminated corn. The germinated corn meal was used in the preparation of corn chips. Re-analysis of the nutrients revealed that there was a slight decrease in riboflavin, niacin and RNV, whilst there was a marked decrease in thiamin content in the corn chips.

**658. M. PADAVATAN and S.K. BERRY**

Amino acid and fatty acid profile of Malaysian cocoa beans during processing

*Proceedings of the 2nd Symposium of the Federation of Asian and Oceanian Biochemists*, 10–12 October 1979, Kuala Lumpur; edited by H.T. Khor, K.K. Ong and K.C. Oo; pp. 137–147

Malaysian cocoa beans have been characterised by chocolate manufacturers to be of a poor flavour compared to those of West-Africa. Research has been carried out to reduce the acid content of the beans to increase their flavour. This paper presented a profile of amino acid and fatty acid changes in the cocoa beans and their pulp during the

post-harvest processes of fermentation and drying. Preliminary studies show an increase in triglyceride fatty acids with a decrease in amino acids in the beans. The individual amino acids and fatty acids changes were described in detail. Their contribution to the production of flavour compounds were briefly discussed.

#### 659. SALMAH MUDA and MOHD. ISMAIL ABDUL KARIM

##### Tempeh as a snack item

*Malaysian Institute of Food Technology Bulletin*, 3:50, 1979

Fresh tempeh was fried and packaged in polyethylene bags (flushed and non-flushed with nitrogen gas). The packaged samples were kept for a period of 6 weeks. Studies were conducted on the organoleptic qualities, as well as biochemical and microbial aspects of the snack product during its storage period. The freshly prepared fried tempeh contained an average of 3.4% moisture, 3.73% ash, 45.13% fat and 30.18% protein. Amino acid analysis showed that cystine and lysine were adversely affected during frying, the fried product generally containing about 40% of the essential amino acids. The product was found to be biochemically relatively stable during its storage period both in the flushed (with nitrogen) product and non-flushed product.

#### 660. C.C. SEOW

##### Processed foods and the consumer

*Report of the Seminar on Health, Food and Nutrition, 15–20 September 1979 Penang*; 8 p. (mimeographed)

Many of the fears and criticisms of the effects of modern food processing have been based on irrational beliefs arising out of misinformation or semi-understood knowledge. This paper discussed some of these beliefs and misconceptions. The processing and preservation of food was said to have substantially overcome the problem of seasonal fluctuations in food supplies, and significantly reduced wastages of food, whilst special nutritionally balanced fabricated foods have been used successfully to combat nutritional inadequacies. Food processing has been carried out to protect consumers from natural harmful substances in food, thereby improving their nutritional value. Food additives have been used to fulfill several important functions, although they have sometimes been inappropriately used by some unscrupulous manufacturers. With regards to nutrient losses, it was pointed out that factory-processed foods compare favourably with many of their freshly cooked counterparts, and can even be nutritionally better compared with foods not so well prepared in the domestic kitchens. It was emphasized that the basic need of food consumers in developing countries is education to enable them to distinguish between the facts and the fads. At the same time, food processors have the responsibility to gain the confidence of the public by ensuring that processed foods reach the consumer in a wholesome, nutritious and palatable condition.

**661. P.M. SIVALINGAM**

**Biochemical evaluation of the Malaysian sea lettuce, *Ulva reticulata* Forsskal, as a potential food source**

*Proceedings of the Symposium on Protein Rich Food in ASEAN, Kuala Lumpur, 12–13 July, 1979*; edited by Zahara Merican, Q.L. Yeoh, S.K. Berry, E.C. Chuah and G.C. Ch'ng, pp. 118–125

Survey on the distribution of the Malaysian sea lettuce, *Ulva reticulata* Forsskal, in the Island of Penang indicated fairly large amounts of the green algae in mud flats off Tanjong Tokong, Middle Bank and between the coastal areas stretching from Sungai Pinang to Sungai Bayan Lepas. Instead of letting the seaweed deteriorate in the coastal areas, a general survey of its seasonality, mineral, protein, lipid and steroidal contents were investigated. The amino acid and fatty acids compositions were also analysed. Based on the results obtained from this complete nutritive evaluation, it was felt that the sea lettuce could be an additional beneficial factor to the fishing community. The low content of cholesterol, high content of iodine, protein and very low content of long chain fatty acids were thought to make this a healthy food source.

**662. YU SWEE YEAN and CHEAH CHOOI HWA**

**Nutritive value and toxicity of *Sauropus albicans*, a Malaysian leafy vegetable**

*Food and Nutrition*, 5(1):38, 1979

*Sauropus albicans* is a leafy vegetable popular in Malaysia and known by various names: *cekur manis*, *cekop manis*, *cangkok manis*, or *asin-asin*. Of Indo-Malaysian distribution, it is often cultivated in backyards and may occur wild near villages. It is not cultivated on a commercial scale, but is readily available in markets especially in rural areas. This brief technical note described the cultivation of this vegetable, and its nutrient composition. The presence of the alkaloid papaverine and its possible pharmacologic effects were also described.

**663. ZAINAB HASHIM, AHMAD ZAHARUDIN IDRUS and POEDJONO NITI—WESOJO**

**Formulation of an enriched food from locally available materials**

*Proceedings of the Symposium on Protein Rich Food in ASEAN, Kuala Lumpur, 12–13 July, 1979*; edited by Zahara Merican, Q.L. Yeoh, S.K. Berry, E.C. Chuah and G.C. Ch'ng; pp. 37–50

Although breast milk is the best natural food for human infants during the first year of life, there are cases where breast feeding is not possible due to various reasons. Hence, commercial infant foods have an important role to play and are being produced widely. Malaysia imports about \$28 million (1974 figure) worth of powdered milk for use by infants and children and it has been estimated that it will increase in the near future. This paper discussed the work carried out in producing a food formula for infants/children using locally available materials. The formula was based on soy protein isolates, maltodextrin and glucose syrup, palm oil, and fortified with methionine, various minerals and vitamins, so that the composition of the formula was almost similar to that of full cream milk powder. The chemical composition and the protein-

efficiency ratio (PER) of the formula was determined. Shelf-life of the product was also studied. It was felt that there is considerable scope for the utilization of formulae such as the one studied for use as supplements to the diets of weaned infants and young children in the region.

#### 664. ZANARIAH JIMAN

##### Mee, noodles and related pasta product industry in Malaysia

*Report No. 187, Agricultural Product Utilisation Division, MARDI, Serdang, 1979; 30 p.*

Mee, noodles and related pasta products industry is one of the major food industries in Malaysia. The paper described the methods of manufacture in some of the factories in Selangor and Kuala Lumpur, and the problems faced by these industries. The basic form of pasta and noodle products or the basic quality of the raw material have not changed appreciably through the centuries. Technological advances in processing in the West have changed the small scale 'cottage industry' of the past to large, modern efficient plants. However, in Malaysia the small scale cottage industry is still prevalent for the manufacture of noodles and mee. The larger modern plants are involved in the production of instant noodles and instant mee which have good market potential as convenience foods. Paste products in general have good consumer acceptance in the country and can be nutritionally improved by addition of proteins, minerals and vitamins. The consumption of these products is increasing and the prospects for paste products industry are said to be bright. The nutritional quality of these products are given in another publication by the same author (see abstract no. 676).

#### 665. ZANARIAH JIMAN

##### Available lysine content of some Malaysian foods

*Malaysian Institute of Food Technology Bulletin, 3:38–45. 1979\**

The nutritive value of food protein depends on its amino acid content and also its physiological availability. Lysine has been well established in its nutritional role as one of the important essential amino acids. Because of its epsilon amino group, lysine is particularly susceptible to side reactions and cross-linking, making it unavailable. The available lysine of some Malaysian foods has been studied and reported in this paper. Nine fermented foods, 6 types of soya sauce, 3 samples of *budu*, 5 types of canned and packaged meat products prepared by APU, MARDI, and several types of noodles and pasta products were analysed. It was found that pasta products, with their protein from cereals, showed deficiencies of available lysine. Animal proteins contained higher amounts of this amino acid. Thus animal proteins cooked with noodles and pasta products are suited to balance the relative deficiencies of products containing cereal proteins. Comparatively cheap sources of proteins such as from fermented foods like *belacan*, *budu*, fermented salted soya bean were found to be comparatively rich in the amino acid.

\* Also in MARDI, Agricultural Product Utilisation Division Report No. 225



**666. ZANARIAH JIMAN and ZAHARAH MERICAN**

**Nutritive value of some common Malaysian fermented foods**

*Proceedings of the Symposium on Protein Rich Food in ASEAN, Kuala Lumpur 12–13 July, 1979*; edited by Zahara Merican, Q.L. Yeoh, S.K. Berry, E.C. Chuah and G.C. Ch'ng; pp. 51–56

Samples of several varieties of our indigenous fermented foods obtained from the markets and grocery shops were analysed for their moisture, protein, fat, vitamin A, thiamin, riboflavin, niacin, and vitamin E contents. The fermented products analysed included vegetables (*lobak masin*, *sawi masin*, *bamboo shoot*), fish and shrimp and their sauces/pastes (*cincalok*, *budu*, *belacan*, *ikan tenggiri masam*), eggs (*telor asin*), soybeans (*taucho*), durian (*tempoyak*) and *toddy*. It was observed that *ikan tenggiri masam* (salted fish) and *belacan* were exceptionally rich in protein. *Toddy* and *sawi masin* contained a high percentage of vitamin A. All of the fermented foods studied contained substantial amounts of the B vitamins. Although fermented foods may not be considered as major contributors of protein in the diet, nevertheless they provide flavour, vitamins and minerals to the consumer.

**667. ABDUL SALAM BABJI, G.W. FRONING and L.D. SATTERLEE**

**Protein nutritional quality of mechanically deboned poultry meat as predicted by the C-PER assay**

*Journal of food Science*, 45(3):441–443, 1980

Since more poultry meat is going into further processed products, efficient utilisation of deboning machines to recover valuable protein will result in greater production of mechanically deboned poultry meat (MDPM). As a result, concern over nutritional quality of this protein source has been expressed by certain governmental agencies and others. In this study, mechanically deboned poultry meat (MDPM) from raw broiler backs and necks (MDCM), cooked mechanically deboned chicken meat from fowl carcasses (CMDPM), and raw turkey frames (MDTM) were evaluated for their nutritional composition and quality. Procedures for evaluation included protein efficiency ratio (PER) using rat and computed PER (C-PER) techniques, *in vitro* and *in vivo* digestibilities, amino acid composition, and proximate analysis. All three types of MDPM showed PER and C-PER values comparable to those for standard casein. Results obtained also indicated that C-PER values were quite comparable to rat PER values and would be a valuable assay tool due to its speed and cost, as well as its ability to pinpoint the causes of high or low protein quality.

**668. SHIV K. BERRY**

**The fatty acid composition and cyclopropene fatty acid content of the maturing Okra (*Hibiscus esculentus*, L.) fruits**

*Pertanika*, 3(2):82–86, 1980

Okra (*Hibiscus esculentus*, L.) fruits are consumed as vegetable throughout the world. The fatty acid composition of the fruits harvested on the 5th, 6th, 8th and 12th day after flowering was determined by gas liquid chromatography. As the fruits matured, C16:0 fatty acid content increased with a corresponding sharp decrease in C18:3 fatty acid concentration. The lipids in immature fruits contained C24:0 fatty acid,

whereas the oil recovered from fully matured seeds had C21:5 fatty acid instead. Cyclopropene fatty acids were not detected in the lipids of immature fruits, occurring only in small amounts in the oil of fully matured seeds.

#### 669. CHE RAHANI ZAKARIA

##### Study of quality of locally produced fresh milk

*Report No. 217, Agricultural Product Utilisation Division, MARDI, Serdang, 1980; 34 p.*

The study was aimed at determining the bacteriological as well as chemical quality of the milk produced at farmers level and at Milk Collecting and Cooling Centres (MCC) in various parts of the country. Samples of milk for analysis were taken from four different sources, i.e., direct from the teats, farmer's churn, MCC's churn and cold rooms. These were analysed for bacteriological quality by Total Plate Count (TPC), Methylene Blue Test, and Resazurin Test. Specific gravity, acidity and composition (fat, protein, solid non-fat, total sugars, ash and total solids) of the milk samples were also determined. From the bacteriological viewpoint, the samples obtained from all the six MCC's were found to be of poor quality. In terms of chemical composition, the samples were found to be rather satisfactory. It was emphasized that in order to have good quality milk of low initial bacterial load, cleanliness in the production of milk must be improved.

#### 670. N. ISMAIL and C.C. SEOW

##### Traditional Malaysian intermediate moisture foods: preparation, properties and improvement

*Proceedings of the International Symposium on Food Technology in Developing Countries, 3–5 September 1980, Kuala Lumpur; edited by S.K. Berry, Mohd. Ismail Abd. Karim and Asiah Mohd. Zain; pp. 299–323*

The characteristic features of Intermediate Moisture Food (IMF) include a moisture content (usually 20–50% on dry basis) high enough to make the food ready-to-eat without the need for reconstitution, and a water activity (usually 0.6–0.9) low enough to ensure a reasonable degree of protection from bacteriological spoilage without the need for refrigeration or thermal processing. Since they do not require rehydration, they have relatively good shelf-stability, and they can be easily and cheaply transported and distributed. Such foods could play a significant role in food and nutrition intervention programmes especially in rural situations. IMF can be conveniently divided into two broad categories, viz high protein-high calorie, and low protein-high calorie IMF. The former group includes various types of IM meat products such as *sambal daging* (spiced meat), *sambal udang kering* (spiced prawn), and *heko* (prawn extract). Such foods are thought to be able to contribute to the alleviation of the protein-calorie malnutrition problem prevalent in the rural areas of many developing countries. *Lempok* (durian cake), *dodol*, *pulut kacang* (both glutinous rice cakes), *halua maskat*, and candied nutmeg belong to the second category. Carbohydrates, mainly starch and sugars constitute the major components. The excessively sweet taste of some of these products obviously limit their intake and general acceptability. The chemical compositions (though not complete nutrient contents) of these IMF were tabulated. The production technology and the storage stability of these foods were also discussed in some detail in this report.

671. H.T. KHOR, N.H. TAN and K.C. WONG

Wing bean seed : a potential food source for the tropics

*Proceedings of the 6th Malaysian Biochemical Society Conference, 22–23 August 1980, Kuala Lumpur*; edited by K.C. Oo; pp. 157–162

Protein, trypsin inhibitor and oil contents of several varieties of winged bean (*Psophocarpus tetragonolobus*) seeds were investigated. The seed protein content varied from 32 to 42.4% of the wet weight of the seeds and trypsin inhibitor content was found to vary from 2.77 to 6.29 million inhibitor units per 100 g of seeds. The winged bean seed oil content varied from 16.5 to 24.8% of the wet weight of the seeds. Analysis of the fatty acid composition by gas chromatography showed that most of the fatty acids were unsaturated in nature. There appeared to be no major qualitative differences in fatty acid components among the varieties, but quantitative differences were fairly obvious. All existing evidence was said to indicate that winged bean seeds had a great potential as vegetable protein and oil sources in the tropics.

672. MOHD ISMAIL NOOR, BRESSANI, B. and ELIAS, L.G.

Changes in chemical and selected biochemical components, protein quality, and digestibility of mung bean (*Vigna radiata*) during germination and cooking

*Qualitas Plantarum Plant Foods for Human Nutrition*, 30:135–144, 1980. Also in: *Proceedings of Legumes in the Tropic, UPM, 1980*, pp. 479–488

The effect of gemination and of the cooking process on the nutritive value of mung beans (*Vigna radiata*) was studied. Raw and cooked samples were taken 0, 2 and 4 days of germination. Water content increased, but crude protein, lipids, crude fiber, ash and carbohydrates decreased with germination. Trypsin inhibitor activity did not change significantly while hemagglutinins were absent. Essential amino acids (methionine, tryptophan and lysine) were found to have decreased with germination. Net protein ratio (NPR) and protein efficiency ratio (PER) in rats decreased with germination especially in cooked sprouts. True digestibility did not change consistently due to germination or cooking. There was thus a loss of protein quality in mung beans upon germination and cooking.

673. RUBIYAH JAMIL\*

The effect of dietary fibre on dry matter, energy, and nitrogen digestibilities and protein efficiency ratios at two levels of fat

*Thesis submitted to the West Virginia University in partial fulfillment of the requirements for the Degree of Master of Science, 1980*; 54 p.

The effect of dietary fibre and level of fat on nitrogen, energy and dry matter digestibilities and on growth was investigated in albino rats. Three fibre forms (wheat bran, cellulose and pectin) were used for the formulation of experimental diets. A no-fibre diet was also included. For each of the four diets mentioned, two levels of fat (15% and 25%) were formulated. Dietary fibre was shown to have significantly reduced apparent digestibilities of dry matter, energy, and nitrogen. At the higher fat level, digestibilities of dry matter and energy were significantly reduced; nitrogen digestibi-

lity was however not significantly reduced. PER was lower in low fat group than in the high fat group. Among the different forms of fibre, pectin was seen to have resulted in the lowest PER. At low fat level, there was no significant difference in PER values between the fibre and no-fibre diets. Pectin however had lower PER compared to bran diet. At high fat level, pectin and wheat bran had lower PER than cellulose or no-fibre group.

\* Author currently in Department of Human Development Studies, Universiti Pertanian Malaysia, Serdang

#### **674. SITI HALIJAH MOHD ALI**

##### **Ascorbic acid content of sweet potatoes**

*Report of the MARDI Food Technology Division Seminar on Recent Trends in Food Research and Development, 26–27 August 1980, Serdang; 21 p. (mimeographed)*

Ascorbic acid was determined on fresh and canned sweet potatoes using two methods. The first was a rapid photometric method, making use of 2,6-dichlorophenolindophenol, measuring only the reduced ascorbic acid content, and the second method was a 2, 4-dinitrophenylhydrazine method, measuring the total ascorbic acid content. Values obtained were discussed in relation to between cultivar differences and the effect of processing on the vitamin content.

#### **675. ZAINOL ABIDIN MOHAMAD**

##### **Fatty acid composition of some of the Malaysian fresh water and marine fishes**

*Project report submitted to University Pertanian Malaysia in partial fulfilment of the requirements for the Degree of Bachelor of Food Science and Technology, 1980.*

A total of 9 species of Malaysian fish, including 6 fresh water and 3 marine, were analysed for their lipid content. They were found to contain lipid in the range of 1.1 to 2.4% which was not affected by the storage temperatures and times employed. Fatty acid composition of the oil of these fishes was determined by gas chromatography. It was found that all the fish species contained 16:0 acid as their predominant fatty acids. The oils of marine fish were found to contain higher proportion of 20:5 and 22:6 acids but were low in 18:2, 18:3 and 20:4 acids when compared with fresh-water fish. The effect of storage temperatures (0–5°C and –17°C) and times (3 days to 4 weeks) on the changes in fatty acid composition was also examined. A decrease in 18:3 fatty acid and an increase in 20:4, 20:5 and 22:6 fatty acids was observed during storage under these conditions. The changes in fish quality during storage were monitored by measuring the TBA number. A comparison in terms of shelflife quality between the processed (degutted and beheaded) and whole fish was also carried out.

#### 676. ZANARIAH JIMAN

The nutritional quality of mee, noodles and related pasta products, consumer-available in Malaysia

*Report No. 226, Agricultural Product Utilisation Division, MARDI, Serdang, 1980; 26 p.*

Pasta products, made usually from wheat and rice flours, are playing an important role in the diets of Malaysians, being often taken instead of rice during the main meals as well as snacks by the people. The nutrient composition of these products available in the local markets, both locally produced as well as imported, were analysed. The effects of cooking on their nutrient contents were also investigated. The products studied included several brands of instant noodles, mee, mee-hoon, spaghetti, and macaroni. The protein content of the products varied from about 4% to 14%. Those made from wheat flour have above 9% protein whereas those from rice have about 4% of the nutrient. The fat content of the products varied from as low as about 1% to about 20% especially those of instant noodles. Carbohydrate content ranges from about 65% to 95%. It was found that there was no marked decrease in the nutrient contents after a short cooking period. Although these products are high in calories and carbohydrates, they do contribute significant amounts of vitamins, minerals, and protein to the Malaysian diet.

#### 677. SHIV K. BERRY

Fatty acid composition and organoleptic quality of four clones of durian (*Durio zibethinus*, Murr.)

*American Oil Chemists Society Journal*, 58(6):716–717, 1981

This study was undertaken to determine and relate the lipid content and fatty acid composition of four different durian (*Durio zibethinus*, Murr.) clones, i.e. D24, D2, D66, and D8, with their respective organoleptic scores. Both lipid content and the fatty acid composition were found to vary among these clones. Clones D24 and D2, which contained a higher proportion of lipids but lower unsaturated fatty acid contents, received high organoleptic scores when compared to clones D66 and D8. It was found that the lower the palmitic: palmitoleic acid ratio in the lipid of a durian clone, the higher its organoleptic quality.

#### 678. JINAP SELAMAT

Food analysis in Malaysia — an overview

*Report of the 1st ASEAN Workshop on Food Analytical Techniques, 12–14 February 1981, Singapore; 14 p.*

Some studies of the properties and components of foods carried out, especially those by the Department of Food Science and Technology, University of Agriculture and the Agricultural Product Utilization Division of MARDI were reviewed. The types of studies carried out for each of the food groups were briefly described.

#### 679. MOHAMED ISMAIL ABDUL KARIM

##### Preliminary studies on nutritional qualities of Malaysian tempeh

*Pertanika*, 4(2):129–132, 1981

Commercial tempeh and soya bean purchased from small processors and markets at various places in Malaysia were analysed for moisture, protein, fat, ash, crude fibre and total amino acids. Tempeh was found to have 65.08% moisture, 40.22% protein, 21.73% fat, 4.18% ash and 9.39% crude fibre. No significant difference was found in the protein and ash content between the tempeh and unfermented soya bean. The fat and crude fibre in tempeh were however found to be significantly higher than in the bean. Not much difference was found in the amino acid pattern of soya bean and tempeh. Tempeh was found to have glutamic acid and aspartic acid as the major component of amino acid. It was also rich in lysine, arginine, and leucine. Methionine and cystine content however were found to be low. It was found that through the process of fermentation, tempeh had improved protein quality because of the availability of amino acids.

#### 680. MOHD ISMAIL NOOR, R. BRESSANI and L.G. ELIAS

##### The complementation effects of dietary protein of ungerminated and germinated mung bean (*Phaseolus aureus*) with rice

*Abstract — XII International Congress of Nutrition, 16–21 August 1981, San Diego, California. To appear in Archives of Latin American Nutrition*

Biological evaluation using rats were carried out to determine the complementation effects on dietary protein of cooked mung bean/rice and cooked germinated mung bean/rice mixtures. On an isoproteic basis, bean protein was found to be of a lower quality than rice protein. However, upon complementation with rice, the protein quality of the ungerminated and germinated mung bean/rice mixtures steadily increased when rice was incorporated to provide a 25%, 50% and 75% of the protein in the diet. A comparison study between germinated and ungerminated mung bean/rice mixtures indicated that the latter mixture was of a better protein quality. However, replacement of 50% and 75% of the dietary protein of mung bean by rice showed no difference between the germinated and ungerminated mung bean.

#### 681. RADZIAH ARIFFIN

##### The effects of cooking on the cholesterol level of seafoods

*Dissertation submitted to Universiti Kebangsaan Malaysia in partial fulfillment for the Degree of Bachelor of Science with Honours in Food Science and Nutrition, 1981*

The effect of three methods of cooking on the cholesterol level of crab, squid, fish, shrimp, cockle and oyster was studied. These species were fried, boiled or steamed while still fresh or after they were frozen and thawed. For fish, squid and crab, the three methods of cooking significantly decreased the cholesterol level when they were cooked fresh. The amount decreased differed among the species and cooking methods. **Steaming** did not change the cholesterol level, while boiling and frying lowered the cholesterol level significantly in shrimp when cooked fresh. Significant differences in the cholesterol level were not observed among the three methods of

cooking in oyster and cockle which were cooked fresh. Freezing was found to have lowered the cholesterol level in all species when cooked, and no significant differences were found between frying, boiling or steaming on the cholesterol level.

## 682. TEE E SIONG

### **Analyses of nutrients in Malaysian foods : a review**

*Journal of Medical and Health Laboratory Technology Malaysia*, 7(1):37–47, 1981

Reports on the analyses of nutrients in Malaysian foods, dating from the beginning of the century until 1979 were reviewed. All the nutrients that had been reported, the types of foodstuffs studied and the Food Tables published were examined. Interesting developments in vitamin analysis of local foods were observed. In keeping with international developments, there had been a definite change in methodologies as well as the units in which the results were expressed. Whilst vitamins A and C had been fairly well studied, reports on the B vitamins had been less satisfactory. A less dramatic and interesting picture was observed for the analysis of minerals, although there had also been changes in methodologies. Analysis of these nutrients were said to have been neglected, with emphasis only on calcium, iron and phosphorus. As for the analysis of proximate composition, procedures had remained essentially the same through the years. Fibre analysis however, had received little attention. With regards to the foodstuffs studied, all the classes of foods were said to have been touched upon by one investigator or another, although some classes were better studied than others. However, not all the nutrients were studied in these foodstuffs. Cooked foods and meals were also given little attention. Lastly, all the food composition tables published during the period reviewed were summarised and tabulated. In conclusion, the review outlined a proposal to compile all available data into an up-dated Preliminary Food Table for use in the country. Further work can then be carried out to fill in the gaps or to verify certain data so as to arrive at a comprehensive and up-dated Malaysian Food Composition Table.

## 683. TEE E SIONG

### **Techniques in the analysis of nutrients in Malaysian foods – a review**

*Report of the 1st ASEAN Workshop on Food Analytical Techniques, 12–14 February 1981, Singapore*; 20 p.

The methodologies used in the analysis of each group of nutrients were reviewed. For this purpose, publications from 1900 to 1979 on the analysis of local foods were scrutinised. The analysis of vitamins, the most fascinating groups of nutrients, were first discussed. In keeping with international developments, there had been a definite change in methodologies in the local scene. Generally, biological assay methods had given way to the more convenient and rapid, though not necessarily more accurate, colorimetric and fluorometric methods. There had also been an obvious change in the units in which results were reported, alongside this change in methodology. Changes in methodologies were also seen for the analysis of minerals, as investigators moved from gravimetric to the less tedious volumetric and colorimetric methods. There had not been much problems with the laboratory analysis of proximate composition (moisture,

protein, ash, and fat) in foods; procedures had remained essentially the same through the years. Methods for the analysis of lipids, and the evaluation of protein quality were also briefly discussed.

#### 684. ZAINAB MOHD. HASHIM

*Penggunaan campuran bahan-bahan makanan tempatan untuk makanan kanak-kanak di Malaysia* (The use of locally available foodstuffs in food formulations for children in Malaysia)\*

*Dissertation submitted to Universiti Kebangsaan Malaysia in partial fulfillment for the Degree of Bachelor of Science with Honours in Food Science and Nutrition, 1981*

A food formulation for children was made using locally available materials. The formula had a high protein content of 33%, and a biological value almost equivalent to that of milk protein. Addition of methionine did increase the nutritional value but the difference was not significant. It was felt that the food formula developed could contribute towards solving the problem of malnutrition among children in the developing countries.

\* Dissertation in Bahasa Malaysia

#### 685. ZALIHA OTHMAN

*A study on the total lipid composition of Malaysian winged bean (*Psophocarpus tetragonolobus* (L.) D.C.)*

*Projects report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Food Science and Technology, 1981*

The winged bean (*Psophocarpus tetragonolobus*) lipids were examined for their physico-chemical characteristics namely refractive index (1.4662), melting point (15.3°C), saponification value (176), iodine value (79.33), acid value (1.3), unsaponifiable matter (2.32%) and fatty acid composition by gas-liquid chromatography. The values of fatty acids as methyl esters were myristic 0.05%, palmitic 7.48%, palmitoleic 0.29%, stearic 5.39%, oleic 35.88%, linoleic 27.79%, arachidic 1.57%, linolenic plus eicosenoic 3.72%, C20:2 0.1%, behenic 14.08%, docosenoic 0.7% and lignoceric 2.73%. Parinaric acid was absent. The lipids components were fractionated by TLC on silica gel G into triglycerides, 1,2-diglycerides, 1,3-diglycerides, free sterols, sterols esters, free fatty acids and phospholipids. The phospholipids comprised 0.12% (as phosphorus) of the total lipids and were further analysed by TLC on silica gel H using chloroform-methanol-water as solvent. Of the six spots observed on the TLC plate, two were identified as lecithin and cephalin. The total sterol content of winged bean oil was 0.32%.

#### 686. ZANARIAH JIMAN

*Nilai pemakanan sayur-sayuran* (The nutritive value of vegetables)\*

*Report No. 241, Agricultural Product Utilisation Division, MARDI, Serdang, 1981, 30 p.*

Vegetables contain protein, carbohydrate, vitamins, minerals and other nutrients. The nutritional importance of vegetables may be seen from two factors, viz their nut-



rient content and the amounts they are consumed. Nutrient composition of vegetables vary with varieties and the conditions in which they were grown. Examples of nutrient composition of some common vegetables were given. Each of the nutrients were discussed in relation to their importance to the body. The effects of processing on these nutrients were also discussed.

\* Report in Bahasa Malaysia

#### 687. AMBOK MAEK MERI

*Kajian awal ke atas penghasilan protein sel tunggal daripada air buangan ubi kayu*  
(Preliminary studies on the production of single-cell protein from tapioca waste)

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Food Science and Technology, 1982.*

*Candida utilis* was used for the production of single-cell protein on hydrolysed tapioca substrate. Maximal yield (6–7 g per liter) was obtained at pH 5.0, temperature 30°C and an ammonium sulphate concentration of 1% v/v. Analysis of the chemical composition of the biomass obtained yielded high protein and ash content, 5.4% and 9.2% respectively. Amino acid analysis showed a high lysine and threonine content, but was deficient in methionine and cysteine.

#### 688. SHIV K. BERRY

Fatty acid composition of 16 groundnuts (*Arachis hypogea*, L.) cultivars grown under Malaysian condition

*Pertanika*, 5(1):20–24, 1982

Groundnut from 16 *Arachis hypogea* L. cultivars were found to contain oil in the range of 43 to 50%. Gas-liquid chromatographic analysis of the oil fatty acid methyl esters revealed the occurrence of palmitic (12.22 to 13.30%), stearic (3.17 to 3.67%), oleic (37.94 to 41.90%), linoleic (34.59 to 37.51%), arachidic (1.63 to 1.85%), eicosaenoic (0.99 to 1.22%), behenic (3.24 to 4.36%), and lignoceric (1.08 to 1.44%) as the major fatty acids. Cultivars Tainang 7, Kidang and Alabama were high in oil content and contained relatively low levels of behenic acid and high oleic/linoleic acid ratio in their oil.

#### 689. ISMAIL BYLAY

*Kajian awal penghasilan protin tunggal (SCP) dari air nenas* (Preliminary studies on the production of single-cell protein (SCP) from pineapple waste)\*

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of food Science and Technology, 1982*

The study was carried out to investigate the potential of using pineapple waste as a fermentation substrate for the production of single-cell protein (SCP). The micro-organism chosen for the source of protein was the yeast *Candida utilis*. Determination of the composition of the pineapple waste showed that it contained 13% sugar, 0.3% protein, 0.4% ash, 15.0 mg/100 g phosphorus and 13.0 mg/100 g calcium. The yeast was allowed to grow in the pineapple waste for 3 hours and 2.8 hours in the potato dex-

trose broth. Optimal temperature and pH for the production of the biomass was 30°C and 4.5–5.5. Analysis of the *Candida utilis* biomass showed that it contained 52.5% protein, 6.8% ash, 3.8% fat and 21.8% carbohydrate. Amino acid analysis revealed that it contained a high concentration of lysine and other essential amino acids.

\* Report in Bahasa Malaysia

#### 690. LEONG SIEW HONG

*Kajian keadaan pemakanan dan pemerosesan buah-buahan Malaysia (Study of the nutritional properties and processing of some fruits of Malaysia)\**

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Food Science and Technology, 1982*

A total of 8 types of local fruits were analysed for their nutritional contents. Analysis was also carried out on the seeds of rambutan, particularly its fatty acid composition. Most of the fatty acids were palmitic, stearic, oleic and arachidic. It was felt that the high fat content of rambutan seed and the long chain fatty acid it contains could be useful for the formulation of cooking oil.

\* Report in Bahasa Malaysia

#### 691. MOHD. IDRIS HJ. ZAINAL ABIDIN, MOHAMMAD MOHD. LASSIM and NORMAH HASHIM

*Tanaman bijian (Cereals and legumes)*

*Dewan Bahasa dan Pustaka, Kuala Lumpur, 1982; 188 p.*

The book (in Bahasa Malaysia) was said to have been written specifically for students in agricultural science, and could serve as a useful reference to agricultural officers, the modern farmers and others interested in plant science. It is divided into three sections. The first dealt with the botany, agronomy and management of cereals and legumes. Aspects such as harvesting, processing and storage of grains were discussed. The last section, which should be of interest to workers in food science and nutrition, dealt with the nutritive value of cereals and legumes, and the processing of these into various foods.

#### 692. MOHAMAD NORDIN ABDUL KARIM and YAACOB CHE MAN

**Soy-based and fish-based products: nutritive and acceptability studies**

*Report of the 4th ASEAN Food Habits Workshop, 29 November – 4 December 1982, Yogyakarta, Indonesia; 15 p.*

Soy-rice snack and fish satay were prepared by traditional methods and their nutritive values and acceptability studies were conducted. These foods contained 12.85% and 48–56% protein respectively. Chemical scores were 61 and 46 while NPU for fish satay was 66. Trials on trained panelists and preschool children aged 2–5 years showed that the products were well accepted. The indications were that they could be used as supplementary foods to help combat malnutrition among rural preschool children.

### 693. NGAIJAN AGALE

*Kandungan zat makanan di dalam beberapa jenis makanan popular di Malaysia (Nutrient composition of some popular Malaysian processed foods)\**

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Food Science and Technology, 1982*

Ten popular Malaysian ready-to-eat foods, *nasi lemak*, *roti canai*, *apam*, *apam balik*, curry-puff, fried mee-hoon, *odeh-odeh*, dumplings and *lepat pisang* were analysed for their proximate compositions. In general, these foods make use of wheat or rice flour as the main ingredient. Results obtained indicated that they contained protein in the range of 4.7–13.4%, fat 2.1–33.1%, carbohydrate 5.7–49.7%, and energy content ranged from 400 – 600 kcal per 100 g sample. These foods generally provided about one-fourth of the energy and one-third of the protein daily intake of an individual.

\*Report in Bahasa Malaysia

### 694. OTHMAN HUSSIN

*Pekasam dari ikan air tawar (Pekasam from fresh water fishes)\**

*Teknologi Pertanian, 3(2): 174–180, 1982*

*Ikan pekasam* which is prepared from fresh water fishes are much liked by the Malay communities, especially those in the rural areas of the northern part of Peninsular Malaysia. The fishes that are commonly used are Tilapia (*Tilapia mossambica*), Keli (*Clarias macrocephalus*), Puyu (*Anabas testudineus*), Haruan (*Ophiocephalus striatus*), Sepat Siam (*Trichogaster pectoralis*), Sepat Ronggent (*Trichogaster trichopterus*) and Lampan Jawa (*Puntius gonionotus*), which fetch little market value when sold fresh. The paper described the fermentation process for the preparation of *ikan pekasam*. Analysis of several samples of the product showed it contains 15–22% protein, 59–71% moisture, 1–14% fat, 5–15% minerals and 4–14% sodium chloride. Studies also showed that pathogenic bacteria such as *Vibrio*, *Salmonella*, *Staphylococcus aureus* and *Clostridium* were not found in the samples dispelling fears that such products are not fit for human consumption.

\*Paper in Bahasa Malaysia

### 695. ROHANA AHMAD

*Kajian awal ke atas sifat-sifat fizikal dan kimia telur penyu (Dermocleys coriacea) (Preliminary studies on the physical and chemical characteristics of the turtle egg (Dermocleys coriacea))\**

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Food Science and Technology, 1982*

Studies were carried out to investigate the physical and chemical differences between the turtle eggs (*Dermocleys coriacea*) and hen eggs. The morphological differences will not be dealt with here. Analysis of the egg white revealed significant differences bet-

ween the two types of eggs at  $p < 0.01$  for their nitrogen, ash and riboflavin content, and at  $p < 0.05$  for protein, isoleucine, glutamic acid, alanine, calcium, sodium, phosphorus and potassium. Significant differences at  $p < 0.01$  were also obtained for the protein, cholesterol, nitrogen and riboflavin contents of the egg yolks. Differences in the types of proteins of the two eggs were also studied by electrophoresis.

\*Report in Bahasa Malaysia

#### 696. SALEHA ABD. JALIL

*Kesan percambahan ke atas komposisi kimia dan nilai pemakanan kacang botor (*Psophocarpus tetragonolobus* (L.) D.C.)* (The effects of germination on the chemical composition and nutritional value of winged bean (*Psophocarpus tetragonolobus* (L.) D.C.))\*

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirement for the Degree of Bachelor of Food Science and Technology, 1982*

The chemical composition and nutritional value of the germinated winged bean (*Psophocarpus tetragonolobus*, (L.) D.C.) were compared with the ungerminated bean. The nutrients studied included protein, fat, carbohydrate, crude fibre, amino acids, fatty acids, minerals and some vitamins. There appeared to be no clear trend of changes after germination as some nutrients had increased whereas some had decreased.

\*Report in Bahasa Malaysia

#### 697. TEE E SIONG

##### Nutrient composition of Malaysian foods: a preliminary table

*Division of Human Nutrition, Institute for Medical Research, Kuala Lumpur, 1982; 73 p. (mimeographed)*

This preliminary table was compiled in view of the lack of a proper recent local food table. All available reports on the analysis of foods in the country were obtained and data transferred systematically into prepared formats. Where necessary, calculations were carried out to determine mean values and to convert results reported in different units. It was also necessary to do so some regrouping of foodstuffs. The compilation has a listing of a total of 648 common food items in the country, out of which 492 are presented complete with information on proximate composition, at least two common minerals and vitamins. Furthermore, out of the total listing, 265 of them contain new data and 116 of them are new food items which have never before been included in any local food table. However, the major use of this preliminary compilation would be to serve as a basis and guide to arrive at a comprehensive Malaysian Food Composition Table.

**698. ZAINAB MOHD. HASHIM and ADELINA ABDULLAH**

**Status report on weaning foods**

*Report No. 246, Food Technology Division, MARDI, Serdang, 1982; 19 p.*

The report described the types of weaning foods available in the Malaysian market. There are two major groups, viz. dry cereals, of which a wide variety is available including rice, oatmeal, barley, mixed cereal and high protein cereals, and instant strained and junior foods. Foods of the latter group are the more convenient forms: they require only to be warmed up. They are however also more expensive. The dry cereals are cheaper and are readily available in the rural areas. There are many varieties to choose from, but the selection of the foods to give a balanced diet to the infant is crucial. Although not so convenient as the strained and junior foods, they are still easily prepared: it involves only the addition of warm water or milk. The nutrient composition of these foods were tabulated in the report and the nutritional value of these nutrients was discussed. The availability and cost of these foods were also considered.

**699. ZANARIAH JIMAN**

*Nilai pemakanan buah-buahan tempatan (Nutritive value of local fruits)\**

*Teknologi Makanan, 1 (1): 25–30, 1982*

The paper reviewed briefly the vitamin and mineral content of some popularly consumed local fruits. Amongst the local fruits, banana, papaya, pineapple, oranges, rambutan and durian are the most consumed and are important sources of vitamin C. Banana, papaya and pineapple are easily grown surrounding the houses and they fruit throughout the year. These fruits are also inexpensive in the markets. Papaya and banana are suitable for the consumption of children and can become important sources of vitamin A and C which may be lacking in their daily diets. Aside from being eaten fresh, these fruits may be made into beverages, cakes and other products.

\*Paper in Bahasa Malaysia

**700. ZANARIAH JIMAN**

**Amino acid changes during soya sauce fermentation**

*Paper presented at the 8th Annual Malaysian Biochemical Conference, 1–3 September 1982, Kuala Lumpur; 19 p. (mimeographed)*

The quality and quantity of the soya sauce produced is dependent on the degree of enzymatic hydrolysis of the proteins present in the raw materials. The release of free amino acids can be used to measure the degree of protein hydrolysis. This study investigated the relationship between fermentation time and the release of amino acids from the soya bean-wheat mixture into the brine solution. Samples were obtained at regular intervals from a local manufacturer. All of the amino acids in the soya bean-

wheat mixture were rapidly dissolved into the soya mash juice when the mixture was placed into the brine. The individual amino acids were leached into the soya mash juice at different rates, but the overall pattern of change was almost the same for the total and free amino acids. Glutamic acid was the most abundantly produced amino acid in the soya sauce fermentation.

#### **701. AZIZ IBRAHIM**

**The changes in nutritive value during germination of mung bean, soybean and winged bean for making sprouts**

*Dissertation submitted to Universiti Kebangsaan Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Science with Honours in Food Science and Nutrition, 1983*

The effect of germination on water, protein, fat, ash, carbohydrate, vitamin C and vitamin E contents in mung bean, soybean and winged bean was studied. These legumes were germinated at  $29 \pm 1^\circ\text{C}$ . The germinated seeds showed the same changes during germination, which were decreased in protein, fat, ash, carbohydrate and vitamin E contents, but increased in water and vitamin C contents compared with dry seeds.

#### **702. CHONG, Y.H.**

**Nutritional considerations in oil palm breeding**

*Background paper prepared for Task Force on Oil Composition of Oil Palm; PORIM, May 1983; 5 p.*

Nutritional considerations are also of importance in influencing market demand and consumer's choice of edible oils. Palm oil may have difficulty in penetrating markets of affluent nations where coronary heart disease is already a public health problem, owing to its saturation. Thus, if it were to take its place amongst the ranks of other edible oils in the affluent industrialized markets, it would be necessary to take into consideration improvements to its unsaturation in breeding programmes. Taking into consideration recent knowledge on the dietary fat-heart hypothesis, recommendations were made for new breeds of oil palm with a desirable fatty acid composition. It was felt that if these nutritional considerations could be realised by selective breeding without compromising the oil's physical qualities and characteristics as demanded by consumers, the Malaysian palm oil could capture a larger share of the world's edible oil market.

#### **703. GHAZALI JOHAN**

**Chemical evaluation of selected Malaysian fruit juices and concentrates**

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Food Science and Technology, 1983*

A study was conducted to evaluate the chemical and nutritional composition of some fruit juices and concentrates available in the local market. Results obtained indicated

that protein, fat and crude fibre content ranged from 0.07 to 0.30%, 1.84 to 11.38%, and 0.25 to 1.37% respectively. Most of the samples studied showed high levels of ascorbic acid and beta-carotene, with values ranging from 23.51 to 275.92 mg and 0.00 to 2.40 ppm, respectively. Values obtained were compared with those present in the orange juice. Degree Brix, pH, titratable acidity and gums of the fruit juices and concentrates were also determined.

#### 704. LATIFAH MOHSAN

*Kandungan protein, kalsium dan feram di dalam empat jenis sayuran kekacang sebelum dan selepas direbus (Protein, calcium and iron content of four types of leguminous vegetables before and after boiling)\**

*Project report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Science (Human Development), 1983*

A study was carried out to compare the protein, calcium and iron content of four types of leguminous vegetables before and after boiling. The samples chosen were *kacang kelor*, *kacang botor*, *kacang sepat* and *kacang panjang*. The pods were boiled for 5–7 minutes until the texture was suitable to be eaten. It was found that the cooked *kacang kelor* had the highest protein content. A significant difference in calcium content was obtained, with the highest level found in the boiled *kacang botor*. There was however no significant difference between the iron content of the four boiled legumes. Compared with the unboiled legumes, the iron and calcium contents were found to have decreased significantly after boiling. The protein content was found to have decreased significantly only for *kacang kelor* and *kacang sepat*.

\*Report in Bahasa Malaysia

#### 705. MAZNAH HJ. MD. DESA

*Menilai kandungan gentian kasar di dalam beberapa jenis sayur-sayuran tempatan jenis kekacang, ubi dan daun (Evaluation of the crude fibre content of three classes of vegetables namely legumes, roots and leafy vegetables)\**

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirement for the Degree of Bachelor of Science (Human Development), 1983*

The study was carried out to evaluate the crude fibre content in three classes of vegetables namely legumes, roots and leafy vegetables. Samples were chosen based on those vegetables commonly consumed by the Malays, Chinese and Indians. The AOAC method for determination of crude fibre was used. Significant differences in crude fibre content was observed for the three classes of vegetables. Legumes were found to give the highest content (average 7.63%) compared to roots (average 5.20%) and leafy vegetables (average 2.40%). Significant differences were also observed in the crude fibre content of vegetables in the same class. *Kacang botor* (average 9.54%), *keladi* (average 5.77%) and *kangkong air* (average 3.88%) were found to have the highest value of crude fibre in the classes of legumes, roots and leafy vegetables respectively.

\*Report in Bahasa Malaysia

**706. MOHAMAD NORDIN ABDUL KARIM**

**The nutritional aspect of fast food in Malaysia**

*Paper presented at the Malaysian Institute of Food Technology Seminar on Mass Catering and Fast Food, 26 February 1983, Kuala Lumpur; 16 p. (mimeographed)*

In Malaysia, the more than 100 fast food outlets offer fried chicken, burgers, pizzas and satay. A study was conducted to determine their popularity through questionnaires, in order to know the contribution of such fast foods to the food intake. Proximate composition of samples of these foods were also analysed in the laboratory. Results obtained were discussed in relation to contribution to daily nutrient intake, cost, as well as stability of nutrients during processing.

**707. NIK DAUD NIK ISMAIL and A.E. BENDER**

**The content and stability of folic acid in foods**

*Paper presented at the 4th European Nutrition Conference, 24–27 May 1983, Amsterdam*

It has been reported that much of the folic acid in foods is unstable during processing and cooking and may even be lost during storage at room temperature. However, there is little reliable information available on the folate content of foods, and reports of its instability may be due to errors in methodology of assay. Analysis of a number of vegetable foods, a major source of folate, has indicated that it is stable to heat although, being water-soluble, a proportion could be extracted into the water used in processing and cooking. Folic acid could not be completely extracted from raw vegetables and they require a preliminary autoclaving, as shown by studies on lettuce, red peppers and green cabbage. Autoclaving did not appear to be destructive to any significant extent. There was also no destruction of the vitamin after boiling the vegetables for 20 minutes.

**708. NIK-DAUD NIK ISMAIL and A. E. BENDER**

**Methodology of folic acid assay in foods**

*Paper presented at the 4th European Nutrition Conference, 24–27 May 1983, Amsterdam*

Many of the earlier assay methods for folic acid have been found to be unreliable because the method requires rigid control of several factors which were not recognized at the time. Current procedures have been successfully applied to blood but have not, so far, been extended to foods. The method depends on the growth response of *Lactobacillus casei* to a phosphate-buffer extract of the vitamin. This organism responds only to 'free folate' (three or fewer glutamate residues) and the assay of total folate requires a preliminary treatment with a conjugase enzyme system to liberate the free form. Some of the finer points of the method and the precautions to be taken during the analysis were discussed.



#### 709. NIK DAUD NIK ISMAIL and A.E. BENDER

##### Folate content of foods

*Paper presented at the 4th European Nutrition Conference, 24–27 May 1983, Amsterdam*

There is little information about the folate content of foods. This could be due to the lack of a standard procedure for the determination of the vitamin in foods. There are differences in extraction procedure, choice and maintenance of test-organism, deconjugation process, assay set-up, incubation period and response measurement. A study was thus carried out on several of the above factors in order to make the assay more reliable and efficient. With the improved procedure, analysis of a number of vegetables was carried out. Results obtained had indicated that the vitamin was stable although, being water-soluble, a proportion could be extracted into the water used in processing and cooking. Studies on canned vegetables showed that a fair proportion of the folate had diffused into the liquid portion. Thus, discarding the liquor from canned vegetables would result in a considerable reduction of folate provided by these foods.

#### 710. NORAIHAN OTHMAN

##### A study on the quality changes in frying oil

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Food Science and Technology, 1983*

The quality of frying oils used in three different commercial food preparation sites was evaluated and compared with that of the deep frying oil subjected to repeated frying performed in the laboratory. The quality of the oils were evaluated by measuring the free fatty acid content, peroxide, iodine and anisidine values, colour intensity, viscosity, density, ultraviolet absorption at 232 and 268 nm, smoke point, refractive index and fatty acid composition of the oils. It was observed that the quality of the oil samples from commercial food preparation sites did not change significantly as the period of frying progressed, whilst some of the parameters had changed for the laboratory frying experiment. This was thought to be due to the replenishing of oil in the commercial fryers. From the study, it was concluded that the stability of the deep frying fat subjected to high temperatures was dependent upon a number of factors such as type of the fat used, heating time and temperature, the area of fat exposed to the atmosphere and the type of food fried.

#### 711. NORAINI ISMAIL

*Kesan suhu dan tempoh penyimpanan terhadap kemusnahan asid askorbik di dalam jus oren (The effect of temperature and duration of storage on the destruction of ascorbic acid in orange juice)\**

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of requirements for the Degree of Bachelor of Science (Human Development), 1983*

The current popularity and general availability of the packed orange juice in the market prompted this investigation into the concentration and stability of ascorbic

acid in this juice under different storage conditions. Five different commercial brands of orange juice were selected for the study. The research design employed was said to be a 3 x 4 x 5 factorial. The factors involved were three different temperatures, four storage periods and five different brands of orange juice. Ascorbic acid content of the juice was determined by the 2, 6-dichloroindophenol method, and a range of 11.02 to 46.07 mg/100 ml was obtained. A highly significant difference in the ascorbic acid content among the brands was observed. However, the effects of temperature and storage periods on the degradation on ascorbic acid in each brand were found to be non-significant, indicating that the vitamin in the packed orange juice was highly stable.

\*Report in Bahasa Malaysia

#### 712. NORLIZA SALLEH

*Penentuan terhadap kandungan vitamin C, bahan pewarna, asid sitrik dan lain-lain dalam jus oren (The determination of vitamin C, colouring matter, citric acid and other parameters of orange juices)\**

*Project Report submitted to Universiti Kebangsaan Malaysia in partial fulfillment of the requirements for the Degree of bachelor of Science with Honours in Food Science and Nutrition, 1983*

Four brands of orange juices available in the local market were used in this study. They were prepared according to the instructions given on the label and analysed for vitamin C, colouring matter, pH, citric acid, soluble solid content, as well as a sensory evaluation. The values obtained were compared with the declared contents on the label.

\*Report in Bahasa Malaysia

#### 713. ROKIAH HJ. IBRAHIM

*Nutritional evaluation of winged bean (*Psophocarpus tetragonolobus* (L) D.C.)*

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Food Science and Technology, 1983*

Dry matured winged bean (*Psophocarpus tetragonolobus*, L.) seeds were germinated at 26 – 28°C for 5 days in the absence of light. Proximate analysis, amino acid and fatty acid composition, minerals and vitamins content of germinated and ungerminated winged bean were determined to assess the effect of germination on nutritive composition. The nutritive quality of the beans was also measured by Net Protein Utilization (NPU). The NPU, true digestibility and chemical score of the germinated winged beans were found to be higher than the corresponding values for ungerminated beans. This improvement in the nutritive quality of germinated winged bean seeds was attributed to the inhibition of proteolytic inhibitors and other toxic components of the seeds. A study of the winged bean oil using Protein Efficiency Ratio (PER) indicated that the oil had no adverse effect on the body growth except for a slight reduction in the body weight of the rats. Its effect on the internal organs of the rats was not significant.

#### 714. SABTURIAH SULAIMAN

##### Nutritional and antinutritional factors in *Parkia speciosa*, Hassk)

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Food Science and Technology, 1983*

The nutritional and antinutritional factors in petai (*Parkia speciosa*, Hassk.) were determined so as to supplement the lack of scientific data on the nutritional value despite of its popularity as food. Proximate analysis indicated the presence of significant amounts of proteins in petai. Amino acid analysis showed that it was rich in lysine but limiting in methionine and cystine, with a chemical score of 54. Gas chromatographic determination of fatty acids showed the presence of high amounts of behenic acid (C22:0), but absent in linoleic acid. The saturated and unsaturated fatty acids were 46 and 54 per cent respectively. High concentrations of minerals were also observed. Negligible amounts of beta-carotene, thiamin and riboflavin were detected, although niacin and vitamin C were present. Toxic substances present, such as tannin, nitrate, nitrite and phytic acid, were in levels that may be insignificant to cause toxicity to man. Studies on trypsin inhibitor and hemagglutinin activity of the petai were also carried out.

#### 715. SUHAILA MOHAMED and SABTURIAH SULAIMI

##### Nutritional and antinutritional constituents of *Parkia speciosa* petai/sawak)\*

*Paper presented at the 4th Asian Congress of Nutrition, 1–4 November 1983, Bangkok; 13 p. (mimeographed)*

*Petai* is a vegetable of the legume family. The pods contain 12 to 18 seeds. The vegetable has an objectionable smell and when eaten, this smell is exhaled by the consumer. The body also excretes the distinct smelling compound through the skin, urine and faeces. In this study, *petai* bought from the local markets were analysed for their proximate composition, amino acid and fatty acid composition, and several vitamins. Several antinutritional constituents were also investigated, including tannin, nitrates and nitrites, and alkaloids.

\*Also see abstract no. 714

#### 716. TAN KOK KUN

##### An assessment of the nutritive value and acceptance of a rice-soy mixture as a low-cost high-protein snack

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Food Science and Technology, 1983*

A study was conducted to develop a low-cost high-protein snack food. Four snack formulations were prepared by adding high protein full-fat soy flour (10–40%) to rice flour (60–90%). Proximate analysis (on a dry weight basis) showed that the protein, fat and carbohydrate content of the snacks ranged from 9.54 to 15.44%, 21.03 to 22.92%, and 57.43 to 65.26% respectively. Moisture content of the snacks were found to be relatively low, ranging from 5.11 to 5.26%. The rice-soy snacks were found to

have a better balanced amino acids than rice or soy protein, and the NPU was higher than either rice or full-fat soy flour alone. Acceptability studies were also carried out to determine the most popular formulation. An analysis of the cost of the snacks showed that the cost per gram of protein for the soy-rice snacks formulated were about one-half to two times lower than an ordinary commercially available snack.

#### **717. ZAINAB MOHD. HASHIM and LATIF NASIR**

##### **Nutritional quality of foods served by institutional caterers**

*Report No. 259, Food Technology Division, MARDI, Serdang, 1983; 21 p.*

The diets served and consumed in 4 secondary residential schools were collected every day for 3 days. All meals served in a day, namely breakfast, lunch, evening tea and dinner were collected in duplicate, weighed, mixed and homogenised after removing the inedible portions. The samples were then analysed for moisture content, protein, fat, ash, crude fibre, from which carbohydrate content was calculated. The ash was used for the determination of calcium, iron and phosphorus. The calorific value of the diets were calculated using Atwater factors. It was found that the general level of nutrient intake of the students was adequate and met their nutritional requirements. Although the caterers or food stewards had no basic nutritional knowledge, they planned the menu according to the food budget and guidelines given by the Ministry of Education. Each hostel also had its own Food Committee, comprising of students and residential teachers to help in the planning of the menu according to their taste.

#### **718. ZAINAB MOHD. HASHIM and SAMSURI ABAS**

##### **Caloric value of some selected local fruits and vegetables**

*Report No. 275, Food Technology Division, MARDI, Serdang, 1983; 11 p.*

The caloric value of 16 types of fruits and 72 types of vegetables locally available were analysed for their caloric value using the bomb calorimeter. In general, the vegetables and fruits were found to have low caloric value. Caloric value of the fruits ranged between 31 to 142 calories. Those with higher water content, such as watermelon, Malay apple, starfruit, pineapple, horse mango (*bacang*) were found to be low in caloric value. Fruits with higher carbohydrate content such as banana, breadfruit, durian, jackfruit, passion fruit and jujuba had an intermediate caloric value. The green leafy vegetables were found to have low caloric values, ranging from 16–55 calories. The young tender shoot type of vegetables, mostly the traditional vegetables (*ulam*), had caloric values ranging from 23 to 139 calories. Vegetables like cashew nut shoots, tapioca shoots, curry leaves, *geti*, *selasih* and *salam* were found to have intermediate caloric value.

#### **719. ZANARIAH JIMAN, NOOR REHAN ABDULLAH and ROSNAH OTHMAN**

##### **Hydrolysis techniques for amino acid analysis of foodstuffs**

*Report of the Food Technology Division of MARDI, Serdang, 1983; 16 p.*

The nutritive value of food proteins depends on their content of essential amino acids in combination with the digestibility of the proteins. The amino acid analysis of proteins is therefore an essential part of their nutritional evaluation. Some amino acids

can be determined by specific reactions while they are still attached to the protein molecule. These methods are however limited to a few amino acids. A complete assessment of the amino acid pattern requires hydrolysis of the peptide linkages before separation by ion-exchange chromatography or by gas chromatography. The paper reviewed the hydrolysis techniques for the amino acid analysis of foods. Methods involving acid, alkaline and enzymatic hydrolysis were discussed. The destruction of amino acids in the processes and the suitability of each method were the main points of discussion.

**720. ZANARIAH JIMAN, NOOR REHAN ABDULLAH and ROSNAH OTHMAN**

**Amino acid analysis of foods**

*Report of the Food Technology Division, MARDI, Serdang, 1983; 28 p.*

The paper described in some detail the methodology for the analysis of amino acids in foods. As preliminary steps in the method, protein content of the food is determined, and lipids, nucleic acid and carbohydrates are removed. Hydrolysis of amino acids can then be carried out. Procedures for the chromatography of the amino acids in an amino acid analyser were then described. The hydrolysed protein sample is applied to a chromatography column in a cartridge, containing a small amount of resin previously adjusted to the correct pH. The amino acids in the sample are absorbed onto the cartridge resin and the sample solvent aspirated to waste. The separated amino acids react with the reagents to form a coloured product, the concentration of which is monitored continuously by a colorimeter.

**721. ZANARIAH JIMAN, NOOR REHAN ABDULLAH and ROSNAH OTHMAN**

**Amino acid composition of local marine and freshwater fishes**

*Report No. 269, Food Technology Division, MARDI, Serdang, 1983; 39 p.*

Samples of marine and freshwater fishes were purchased from the local markets for analysis. Fat, moisture and protein content of the fishes were determined. Amino acids were determined using an amino acid analyser. Results were presented for 23 marine fishes and 6 freshwater fishes. The levels of the amino acids in these fishes were discussed. Both marine and fresh water fishes studied were found to be able to provide protein of high nutritive quality when evaluated on the basis of its content of essential amino acids. When compared with FAO reference protein, the fish proteins were found to contain adequate amounts of essential amino acids except for sulphur containing amino acids.

**722. ZANARIAH JIMAN and NAZARIFAH IBRAHIM**

*Nilai pemakanan makanan tradisional (Nutritive value of traditional foods)\**

*Teknologi Makanan, 2(1) : 39–44, 1983*

The paper reviewed the chemical composition and nutritive value of several traditional foods in the country. These foods include those prepared from various sources, such as fish (*budu, pekasam, belacan, cencaluk, ikan masin*), cereals (*tapai pulut, samsu, tuak*),

fruits (*tempoyak, toddi, pisang saiai, asam limau*), vegetables, including legumes and roots (*kicap, taucu, tempeh, tapai ubi*) and eggs (salted eggs). Proximate composition, some vitamins and minerals of some of these foods were tabulated and discussed. The discussion also dealt with the improvement of the nutritional value and the processing methods of these foods.

\*Paper in Bahasa Malaysia

#### 723. AMINAH ABDULLAH and RUTH E. BALDWIN

Mineral and vitamin contents of seeds and sprouts of newly available small-seeded soybeans and market samples of mung beans

*Journal of Food Science*, 49:656–657, 1984

Small-seeded soybean varieties, mainly aimed for use in the sprouted form, were newly available in the United States. This study assessed the influence of germination on the contents of ascorbic acid, B-vitamins and minerals of two small-seeded soybean strains (Jaeraejong 320--7 and SP 75051) and market samples of mung beans. It was found that these soybean varieties were either comparable, or higher, in contents of several minerals and thiamin than the mungbeans. Germination reduced iron and increased phosphorus and sodium contents in both soybeans and mungbeans, but potassium content was not changed significantly. Germination also increased the amounts of thiamin, riboflavin, niacin and ascorbic acid in both the two types of beans.

#### 724. ASIAH M. ZAIN and TEE E SIONG

Use of analytical techniques in food research in Malaysia

*Paper presented at the 2nd ASEAN Workshop on Food Analytical Techniques, 19–24 March, 1984, Surabaya, Indonesia; 14 p. (mimeographed)*

Food products are produced by various processing methods. At each stage of processing, starting from raw materials till the finished products, analytical techniques are used to ensure that the foods produced are sufficiently nutritious, wholesome, free from harmful and hazardous substances and safe for human consumption. The paper reviewed briefly the activities of three institutions in the country, namely the Food Technology Division of MARDI, the Division of Human Nutrition of IMR and the Faculty of Food Science and Technology of UPM, within the context of food analytical techniques. The analytical techniques for nutrient analysis of foodstuffs currently used by these institutions were briefly described.

#### 725. V. CAGAMPANG

A study of metal contents on Malaysian processed meat

*Dissertation submitted to Universiti Kebangsaan Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Science with Honours in Food Science and Nutrition, 1984*

The study was undertaken to determine the contents of 6 metals, namely manganese, zinc, iron, cadmium, lead and copper in beef burgers and sausages produced locally in

comparison with those present in imported beef burgers. The metals were determined by solvent extraction method (dry ashing) and an atomic absorption spectrophotometer. Results obtained showed that local beef burgers had a higher content of Mn, Cu, Cd compared to the imported burgers. It was also found that local beef sausages had higher Cu and Zn contents in comparison to the beef burgers, both local and imported. Proximate analysis showed that carbohydrate content was higher in the local products, but they were lower in protein and moisture content when compared with the imported products.

## 726. NIRMALA MADAVEN

The effect of temperature and length of storage on ascorbic acid in orange juice concentrate

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Science (Human Development), 1984*

The study was aimed at determining the effect of temperature and length of storage on ascorbic acid content in orange juice concentrate. Samples were analysed for their ascorbic acid content over a 21-day period during which they were handled under conditions similar to that in homes. Storage temperatures were at room temperature (28°C) and refrigeration temperature (4°C). The experimental design for the study was factorial (2 x 8) and the laboratory procedure employed to determine the ascorbic acid content was the 2, 6-dichloroindophenol visual titration method. It was observed that the ascorbic acid values of the concentrate were affected significantly by temperature as well as by storage days. For both room and refrigeration temperatures, the vitamin loss became significant after the 3rd day of storage. However, for longer storage periods, vitamin C retention in the concentrate stored in the refrigerator was greater than that stored at room temperature. It was also ascertained that the ascorbic acid content of the orange juice concentrate after 3 weeks of storage still retained a satisfactory level of ascorbic acid for it to be considered a good source of the vitamin.

## 727. NORIHAM ABDULLAH

*Kesan penyimpanan dan pemprosesan ke atas kandungan vitamin C di dalam jambu batu (The effects of storage and processing on the vitamin C content of guavas)\**

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Food Science and Technology, 1984*

A study was conducted to determine the effect of storage and processing on the ascorbic acid or vitamin C content of guavas (*Psidium guajava*, L.). It was found that the vitamin decreased gradually from the outer part (skin) to the inner part (pulp) of the fruit. The storage temperature which was found to be most suitable for maintaining the quality of fresh guava was 5°C at which temperature, the fruit could be stored upto a month without significant loss in the ascorbic acid content. The storage condition found to be most unsuitable for guava was at room temperature (27°C). For processed guavas, it was also found that the major loss of ascorbic acid occurred during processing, whilst a smaller loss occurred during storage.

\*Report in Bahasa Malaysia

## 728. SHARIFUDDIN OTHMAN

### *Komposisi proksimat hasilan daging (Proximate composition of meat products)\**

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Food Science and Technology, 1984*

Proximate analysis and the content of salts, phosphate, soy protein and residual nitrite were analysed on two varieties of meat products (burger and frankfurter). The results of the analysis of the additives were compared with the standard values specified in the Sale of Food and Drugs Ordinance and Regulations, 1952, and selected reference values. Values obtained for the burger were in the range of: moisture 44–54%, fat 12–30%, protein 13–30%, ash, 1.7–2.5%, salt 2.4–2.7%, phosphate 0.2–0.5%, soy protein 22–50% and residual nitrite 1–11 ppm. The range of results obtained for frankfurter products were: moisture 37–55%, fat 20–30%, protein 10–29%, ash 2.3–3.8%, salt 2.7–2.8%, phosphate 0.4–0.6%, soy protein 8–14% and residual nitrite 12–54 ppm. It was concluded that the use of food additives in the meat products analysed were not in excess of the limits set by the food legislation in Malaysia.

\*Report in Bahasa Malaysia

## 729. WONG YOK CHENG

### *Utilisation of cheap fish for fish ball making*

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Food Science and Technology, 1984*

In this project, the quality of commercial fish balls were surveyed, and an attempt was made to develop fish balls from readily available cheap fish. The proximate composition of commercial fish balls was found to be: moisture, 79.65–87.29%; ash, 1.76–2.85%; fat, 0.02–0.39%; and protein, 3.13–14.37%. Borate was found to be in the range of 0.08–0.27%. In the development of fish balls, three types of fish were used. They were processed following the traditional method. Proximate analysis on the finished products was carried out to compare with the composition of commercial fish balls. Organoleptic evaluation was also carried out to assess the acceptability of the products. The use of fish and tapioca flour in the ratio of 7:3, with 6% salt gave acceptable products.

## 730. ZAINUN CHE AHAMAD

### *Development of weaning food based on rice (Oryza sativa)*

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Food Science and Technology, 1984*

A low-cost high nutritional weaning food was successfully formulated. Two formulations, with rice flour as the basic ingredient were prepared. The formulations contained either full fat soya flour or mung bean flour. They were enriched with skimmed milk. Chemical analysis indicated that this newly developed rice-based weaning food had reached the level of the standard weaning food composition. Amino acid analysis



showed that it had a higher quality protein compared to rice, soya or mung bean protein. Sensory evaluations showed that the product was comparable to the commercially available weaning food in terms of colour, flavour, texture and overall acceptability. Alternations of these properties were not pronounced on storage. Other aspects of the product considered were cost, processing, storage and self-life properties.

**731. ABDUL SALAM BABJI, ADNAN, A. and AMINAH ABDULLAH**

**Added soya proteins in processed meats**

*(in press)*

In Malaysia, soya protein is becoming an important source as food binders, fillers and bulking purposes. This is especially true for the processed meat industry where meat substitutes may be added to replace meat in order to reduce the cost of production. This study was aimed at investigating the use of soya protein in local processing of meats and also at comparing the two methods recently used in countries overseas for monitoring the use of soya protein in meat products. Results obtained indicated that most meat products such as burgers and frankfurters produced locally contained between 5–25% added soya protein. It was hoped that with the preliminary data provided, the governing authority would take a serious view towards strictly regulating the proper use of soya protein and other bulking agents in the food industry.

## TOXICANTS IN FOODS

**732. CHIA JOO SUAN**

**Food preservatives and additives**

*Report No. 222, Agricultural Product Utilisation Division, MARDI, Serdang, 1973; 8 p.*

Food additives are chemicals which are introduced into foods to “improve nutritional value, enhance quality or consumer acceptability, improving keeping quality, make the food more readily available or facilitate its preparation for table use”. They may be intentional or incidental additives. All the unintentional food additives are poisonous to some degree, and include the residues of insecticides, fungicides and growth regulators. Vitamins, minerals, colours and flavours are the common intentional additives in foods. Preservative is any substance which is added to a food (usually less than 0.1%) with the intention of inhibiting or preventing microbiological spoilage of the food. Benzoic acid, sulphur dioxide, and nitrites and nitrates are commonly used in food preservation. The use of these additives and preservatives in foods were discussed in the report.

**733. A. BALASUBRAMANIAM**

**Pesticide pollution**

*Bulletin of the Public Health Society, 8:27–32, 1974*

The use of pesticides has been practised for a very long time, although it is only in the

past two decades or so that the modern synthetic organic pesticides have been used so widely. There is no doubt that certain pesticides contaminate the environment to varying degrees. The paper reviewed the effects of pesticides on fish, birds, and man. The use of pesticides in Malaysia is also discussed. The immediate problem of pesticides in the country may be the hazard to users, manufacturers and to the consumers of contaminated food. Constant monitoring for pesticide residues in food, wildlife, industrial effluence, etc. must be undertaken to prevent undue pollution. The industry, government and the general public must view the pesticide pollution problem objectively.

#### **734. DAVID W. LEE, VERONICA H. YAO and F.Y. LIEW**

##### **Lectins in selected Malaysian legumes**

*Malaysian Journal of Science*, 3(A): 89–93, 1975

In addition to the classically described red blood cell binding activity, lectins are also known to possess the following properties: (a) specificity for agglutinating human blood types; (b) mitogenic activity in various mammalian cell lines; (c) specific binding of polysaccharides, and (d) specific agglutination of tumour cells. Thus, lectins are important areas of biological research, including cell surface interactions and cancer therapy. Lectin activity was examined in 14 Malaysian legumes. Seed extracts of 12 species were found to agglutinate mammalian red blood cells. Haemagglutination was specific to human A cells in two cases, but was less specific in all other species. Three species with hemolytic activity were also detected. These activities were further characterised under different reaction conditions; serial dilutions of lectin extracts, and sugar inhibition studies were also used to identify the stereochemical specificity of the saccharide binding sites. Lectin activity correlating with certain pharmacological properties reported for *Pithecellobium* was also observed.

#### **735. CHIA JOO SUAN**

##### **Chemical food contaminants and extraneous matters**

*Report No. 218, Agricultural Product Utilisation Division, MARDI, Serdang, 1976: 7 p.*

Food contaminants refer to undesirable materials which have been added inadvertently before, during, or after processing of foods. Several trace elements as food contaminants were discussed: lead, copper, mercury, and tin. Increased application of pesticides have increased the deposition of these residues in foods and constitute a serious source of food contaminants. Other sources of contamination include containers and packaging materials and mycotoxins. Examples of extraneous matter in foods are insect filaments, pieces of glass, etc. They are present in foods mainly due to for example the use of dirty containers, and improperly washed or handled raw materials. Food contaminants play an important role in affecting the quality of foods. Since it would be difficult to legislate specifically against all possible forms of contaminants, only limits of contamination can be recommended. These were also briefly discussed.

**736. ABDUL H. HALIM, CLYDE E. WASSOM and HOWARD I. MITCHELL**

**The relationships of protein, lysine and trypsin inhibitors of several strains of maize (*Zea mays* L.) and the properties of the inhibitors**

*Proceedings of the Conference on Food and Agriculture Malaysia 2000, July 1977, Serdang*; edited by H.F. Chin, I.C. Enoch and Wan Mohamad Othman; pp. 359–367

Results of studies to evaluate the levels of protein, lysine and trypsin inhibitor in endosperm of genetically different strains of maize (*Zea mays* L.) were reported. Endosperms containing opaque-2 gene showed a decrease in protein and increase in lysine and trypsin inhibitor contents. Floury-2 gene increased protein and lysine contents, but decreased trypsin inhibitor. However, there was no significant correlation between protein and lysine or protein and trypsin inhibitor. A significant, positive correlation was found for lysine and trypsin inhibitor, suggesting that selection for higher lysine in the endosperms of maize, especially in the opaque-2 and normal maize, would result in the inclusion of higher trypsin inhibitor. It was suggested that trypsin inhibitor assays on crude extracts of the maize endosperms could be used to evaluate lysine levels in the endosperms. The isolation, purification and determination of the inhibitor properties were also reported.

**737. G.L. KHOR, J.C. ALEXANDER, J.H. LUMSDEN and G.J. LOSOS**

**Safety evaluation of *Aspergillus fumigatus* grown on cassava for use as an animal feed\***

*Canadian Journal of Comparative Medicine*, 41 (4) : 428–434, 1977

A safety evaluation of *Aspergillus fumigatus* 121, grown in a cassava carbohydrate and salts medium, was undertaken. Male weanling rats were fed the fungus at 10, 30 and 40% of the diet for 90 days. A control group was given soybean oil meal as the sole source of protein. Weekly determinations of the body weights and feed consumptions were made. A few days prior to termination of the feeding study, a kidney function test was undertaken on the rats. At the end of the feeding period haematology, blood biochemistry, urine analyses and histopathology studies of various tissues were carried out, and organs were weighed. Differences in the results obtained for the experimental and control groups were discussed. Histological examinations revealed no significant differences between the two groups.

\*Nutritive value of fungus given in abstract no. 628.

**738. S.S. CHEOK**

**Acute cassava poisoning in children in Sarawak**

*Tropical Doctor*, 8 (3) : 99–101, 1978

Cassava (*Manihot utilissima*) is commonly cultivated in Sarawak, and in fact forms the staple food of some of the State's native tribes. Poisoning due to cassava has been described, but no cases have been documented in East Malaysia. The paper described two cases of acute tapioca poisoning in children in Sarawak. The two Malay children, from the same household, were admitted to the hospital with symptoms of acute tapioca

poisoning after consuming some tapioca cake. Both children recovered after treatment. Chemical analysis of the cooked tapioca revealed 3 ppm cyanide (as CN). Analysis of the uncooked tapioca showed that the upper portion contained 15 ppm and the lower portion 28 ppm cyanide (as CN). The toxicity of tapioca tubers and leaves was discussed.

#### 739. SHIV K. BERRY

The characteristics of the kapok (*Ceiba pentandra*, Gaertn.) seed oil

*Pertanika*, 2 (1) : 1–4, 1979

The Malaysian kapok (*Ceiba pentandra*) seeds were found to contain about 28 per cent oil. The oil from both raw and roasted seeds produced a positive Halphen test for cyclopropenoid fatty acids. Acid value, fatty acid composition by gas–liquid chromatography, iodine value, refractive index, saponification number, and unsaponifiables of the oil were also determined. The percentages of the various fatty acids (as their methyl esters) were : C14:0 (0.25%), C16:0 (24.31%), C16:1 (0.4%), C18:0 (2.65%), C18:1 (21.88%), C18:2 (38.92%), C20:0 plus C18:3 (1%), malvalic acid (7.18%), C22:0 (0.44%), and sterculic acid (2.96%). Malvalic and sterculic acids were determined as  $\text{AgNO}_3\text{--CH}_3\text{--OH}$  derivatives of their methyl esters. Since the cyclopropenoid fatty acids bring about a number of abnormal physiological effects in experimental animals, it would be extremely unwise to consume these seeds.

#### 740. SHIV K. BERRY

Think before you eat

*Suara Akademik (UPM)*, 3 (1): 4, 1979

A variety of unusual seeds and nuts are relished in some Malaysian homes without the knowledge of their nutritinal consequences. Some of these seeds have been examined for their fatty acid composition. These include durian, kapok, China-chestnut, melinjau, petai, jering and nangka, most of which provide mere calories and very little protein. The first four named seeds were found to contain cyclopropene fatty acids in unusually high concentrations, which may only be partially destroyed during normal cooking. Cyclopropene fatty acids have been studied extensively as they may cause numerous physiological disorders in farm and experimental animals. Such deleterious biological effects as cancer in rainbow trout, aortic atherosclerosis in rabbit, infertility of housefly, embryo mortality in Japanese quail, pre- and post-natal mortality among rats were especially of great concern. It is however very difficult to make assumptions as to the toxicity of these fatty acids to man, since no experimental studies have been carried out in primates. The author therefore advised one to be conservative and think before one lays hands on auspicious looking seeds or nuts.

**741. S. JALALUDIN and P. VOHRA**

**Processing of legumes to improve their nutritive value**

*Proceedings of the Symposium of Protein Rich Food in ASEAN, Kuala Lumpur, 12–13 July, 1979; edited by Zahara Merican, Q.L. Yeoh, S.K. Berry, E.C. Chuah and G.C. Ch'ng; pp. 32–36*

A major part of the protein supply for humans and domestic livestock comes from legumes such as soybean, groundnut, various pulses and beans. These legumes are however also rich in anti-nutritive components or toxicants. Some of these toxicants discussed in the paper include lectins or hemagglutinins, allergins, goitrogens, anti-enzymes such as trypsin and chymotrypsin inhibitors, complex carbohydrates, flatulent agents, estrogens, mineral element binders, cyanogenetic glycosides, and mycotoxins. Thus legumes need processing if their full value as protein rich sources is to be realized. The various detoxification procedures that could be employed were discussed. In general, these methods involve extraction of the toxicant, denaturation of proteins, modification of toxicant structure, or preparation of a product different from that of the starting material.

**742. LIM CHIN LAM**

**Food poisoning and contamination in Malaysia**

*Report of the Seminar on Health, Food and Nutrition, 15–20 September 1979, Penang; 14 p. (mimeographed)*

The paper gave a review of the substances or organisms present in food which cause illness or ailment, whether slow or rapid in onset, temporary or permanent, mild or fatal. These substances find their way into food as a result of either deliberate or unintended addition. In the first category include the toxic elements, food additives (preservatives, colouring matters and artificial sweeteners) and pesticides. The unintended or accidental additions to foods include contamination by man-made chemicals, pests, fungi and bacteria (food infection and intoxication). Miscellaneous substances that do not fall neatly into the two categories are scombroid fish poisoning and paralytic shellfish poisoning. These various types of poisoning and contamination were discussed in the context of Malaysia. Local data, where available, were presented. Safety measures and steps for improvement were suggested.

**743. K.S. LOW and C.K. LEE**

**Effect of car exhausts on lead contamination in vegetables grown adjacent to Kuala Lumpur – Cheras Highway**

*Pertanika, 2 (2) : 149–151, 1979*

Earlier studies by these authors had shown that over a wide area of Kuala Lumpur, lead contamination in grass adjacent to heavy-traffic roads could be hazardous to grazing cattle. Realising that a number of vegetable farms are located near heavy-traffic roads, this paper reported the lead content of leafy vegetables and their supporting soil in a commercial vegetable farm some 50 m from the Kuala Lumpur–Cheras Highway which has heavy traffic density. For comparison, vegetables from a domestic garden

located on the Universiti Pertanian Malaysia campus where the flow of vehicles is generally low were also similarly analysed. Results obtained from the study showed that the vegetables grown 50 m or farther away from heavy traffic roads contained lead below the permitted level of 2 ppm and therefore were not seriously contaminated by particulate lead from car exhausts. It was thus suggested that with regard to lead in vegetables as a health hazard, there generally is no cause for alarm at the present time.

#### 744. RAMLI MAN

The problems of aflatoxin in foods and feedstuffs (abstract)

*Malaysian Institute of Food Technology Bulletin*, 3 : 48, 1979

Aflatoxin is a secondary metabolite of some specific strains of *Aspergillus flavus* and *Aspergillus parasiticus*. The amount of aflatoxin produced is known to depend on the conditions of growth, which includes moisture, temperature, substrates and other factors that affect the development of the mould. Two types of tests have been developed for detection and determination of aflatoxin, viz. biological and chemical. Of all the biological tests, chicken embryo bioassay has proved to be the most useful. Chemical assay techniques are said to be more reliable and faster. Farm animals that survived after consuming contaminated feedstuff showed poor growth rate and poor feed conversion ratio. The organ primarily affected was the liver but changes were also reported in most other organs. Positive correlation between dietary aflatoxin and liver cancer in humans should give sufficient justification to regard aflatoxin as a poisonous or deleterious compound. The potential health hazard associated with aflatoxin can be avoided by preventing growth of the mould or by inhibiting the production of the toxin. There is also a good potential for inactivation of aflatoxin in oilseeds and oil-seed meals by chemical means.

#### 745. NGET-HONG TAN, MENG-YEW HO, PERUMAL RAMASAMY, and KOK-ON CHIN

Isolation and preliminary characterisation of trypsin inhibitors from the four-angled bean seed (*Psophocarpus tetragonolobus*)

*Proceedings of the 2nd Symposium of the Federation of Asian and Oceanian Biochemists, 10–12 October 1979, Kuala Lumpur*; edited by H.T. Khor, K.K. Ong and K.C. Oo; pp. 86–102.

The four-angled bean (*Psophocarpus tetragonolobus*), also known as winged bean or *kacang botol* in Malaysia, is a potential protein-rich food source. However, as with seeds of the other leguminosae family, this bean has been found to possess anti-proteinase activity. This paper described in detail the isolation and some properties of the major trypsin inhibitors from the bean.

**746. SHIV K. BERRY**

Cyclopropene fatty acids in some Malaysian edible seeds and nuts. I. Durian (*Durio zibethinus*, Murr.)

*Lipids*, 15 (6) : 452–455, 1980

The aril and seeds of the fruit of durian (*Durio zibethinus*, Murr.) were examined for their protein content and fatty acid composition by gas liquid chromatography. The values (area percentage) for fatty acids as methyl esters were: aril= C14:0 (0.91%), C16:0 (34.13%), C16:1 (7.10%), C18:0 (1.21%), C18:1 (42.14%), C18:2 (7.85%), C18:3 plus C20:0 (5.69%); seeds= C14:0 (0.12%), C16:0 (12.20%), C16:1 (1.15%), C18:0 (1.42%), C18:1 (8.42%), C18:2 (6.50%), dihydrosterculic acid (2.52%), C18:3 plus C20:0 (11.30%), malvalic acid (15.72%), sterculic acid (38.53%) and C22:0 (1.21%). The germ oil contained the highest amount of sterculic acid. The cooking temperature employed reduced the malvalic and sterculic acid contents in seeds only by approximately 22% and 19% respectively.

**747. SHIV K. BERRY**

Cyclopropene fatty acids in *Gnetum gnemon*, Linn. seeds and leaves

*Journal of the Science of Food and Agriculture*, 31 (7): 657–662, 1980

The seeds and leaves of *Gnetum gnemon* (L.) were examined for their fatty acid composition by gas-liquid chromatography, infrared, ultraviolet and nuclear magnetic resonance spectroscopy. They were found to contain cyclopropene fatty acids (CPFA) determined as silver nitrate derivatives of their esters. A *keropok* prepared from the seeds was also examined for its CPFA content. The values (area percentages) for total CPFA were 51.62, 37.87 and 46.91% of the total fatty acids in the oil of seeds, leaves and *keropok*, respectively. The effect of normal cooking temperatures on the retention of CPFA in these materials was also investigated.

**748. SHIV K. BERRY**

Cyclopropenoid fatty acids in some Malaysian edible seeds and nuts

*Journal of Food Science and Technology*, 17(5):224–227, 1980

The presence of cyclopropenoid fatty acids (CPFA), which cause numerous physiological disorders in experimental animals, in some Malaysian edible seed oils was established by the Halphen test and infrared spectroscopy. Employing gas chromatography and *Sterculia foetida* seed oil as a reference standard to identify and quantitate sterculic acid and malvalic acids, oil from the seeds of durian (*Durio zibethinus*), kapok (*Ceiba pentandra*), China-chestnut (*Sterculia monosperma*) and gnetom (*Gnetum gnemon*) were found to contain 65.4%, 10.1%, 18.7% and 51.6% of CPFA respectively. Cooking had no appreciable effect on the CPFA content, and it would therefore seem extremely unwise to consume these seeds or products thereof.

**749. KHOO HOON ENG**

**Metabolism of lead and the laboratory indices of exposure to lead : a review**

*Jurnal Perubatan UKM*, 2(1):60–67, 1980

Under normal circumstances, food, water and other beverages are the major sources of lead in man and probably in most animals. The paper reviewed the various sources of oral uptake of lead, as well as other aspects of its metabolism in the body. The pathological effects of lead on the haemopoietic, renal and the central nervous systems were also reviewed. The diagnosis of lead poisoning and various laboratory parameters that may be used as indices of exposure were discussed.

**750. MOHD. ISKANDAR, EUNICE S.H. LOWE and N.H. TAN**

**The extractability of winged bean seed proteins and some properties of the extractable trypsin inhibitors**

*Proceedings of the 6th Malaysian Biochemical Society Conference, 22–23 August 1980, Kuala Lumpur*; edited by K.C. Oo; pp. 148–156

It is well established that the anti-proteinase activity of the winged bean (*Psophocarpus tetragonolobus*) is potentially anti-nutritional. Both anti-trypsin and anti-chymotrypsin activities have been reported to be present in the bean. In this paper, the effect of pH and ionic strength on the extractability of proteins and trypsin inhibitors from local variety of winged bean seed was reported. Some properties of the extractable trypsin inhibitors were also discussed. It was found that these anti-nutritional trypsin inhibitors accounted for approximately 5% of the seed proteins but were heat labile.

**751. CHIA JOO SUAN and TONG SOO-LONG**

**Mercury content of fish from the river mouth of Sungei Kelang**

*MARDI Research Bulletin*, 9(1):72–77, 1981

This paper reported on the content of mercury in fish caught from the mouth of *Sungei Kelang*. Fishes from ten different families were studied, namely *Pesia*, *Bawal*, *Selangat*, *Kasai*, *Ketuka*, *Duri*, *Semilang*, *Gelama*, *Katang* and *Buntal*. Details of the study, including sample preparation and digestion as well as the determination method used were described. The cold vapour atomic absorption spectrometric technique was adopted for the analysis. Results tabulated showed that most of the samples analysed contained mercury at less than 0.1 ppm, except for *Ikan Ketuka* and *Ikan Duri* which were found to contain 0.241 ppm and 0.112 ppm respectively. These levels were thus well below the maximum permissible level generally considered safe for human consumption, which is 0.5 ppm.

**752. MOHAMAD NORDIN ABDUL KARIM\***

**The effects of polyphenolic compounds (tannins) in sorghum and tea on protein utilisation**

*Dissertation submitted to the University of London in partial fulfillment of the requirements for the Degree of Master of Science, 1981; 33p.*



The effect of tannin in sorghum and tea on digestibility, net protein utilisation (NPU) and biological value (BV) was investigated in experimental animals. For sorghum, digestibility was found to be lowered compared to the control. NPU was low, reflecting the poor quality of the protein present in the sorghum. Since tannin content was low, it was suggested that the presence of other toxic components were probably more important. NPU and digestibility were found to be unaffected by the tannin in tea. When casein was soaked in tea to investigate the effect of tannin on protein, its quality was observed to have been improved as shown by an elevated NPU value.

\* Author currently at the Faculty of Food Science and Technology, UPM

#### 753. ABIDIN HAMID

*Bahaya mikotoksin di dalam makanan (The hazards of mycotoxins in foods)*

*Teknologi Pertanian*, 3(1):69–73, 1982

The paper (in Bahasa Malaysia) gave a brief review of the important mycotoxins known to contaminate foods. The types of aflatoxins and their identification by TLC, their toxicities, and effects on animals were discussed. The occurrence and toxicity of sterigmatosistin, ochratoxin and patulin were also reviewed. It was emphasized that prevention of contamination is the best and most effective way of controlling the occurrence of mycotoxins in foods and agricultural products. Such surveillance should be carried out during planting, harvesting, storage, processing and the utilization of the product.

#### 754. ABIDIN HAMID

*Aflatoxin dan kesannya ke atas kesihatan manusia (Aflatoxins and their effects on the health of humans)\**

*Teknologi Makanan*, 1(1):13–19, 1982

The problem of aflatoxin contamination of foods and other agricultural products and its effect on human health and animals is still not being fully realised by the public. This paper discussed several important aspects of the problem so as to provide further insight into the group of toxins. Topics discussed included types of aflatoxins, factors encouraging the production of these toxins and their contamination of foods, the biological and toxicological effects of aflatoxins, and the control strategies for preventing contamination.

\* Paper in Bahasa Malaysia

#### 755. SHIV K. BERRY

*Fatty acid composition and cyclopropene fatty acid content of china-chestnuts (*Sterculia monosperma*, Ventenat.)*

*American Oil Chemists Society Journal*, 59:57–58, 1982

The China-chestnuts (*Sterculia monosperma*, Ventenat.) were examined for their fatty acid composition by gas liquid chromatography, infrared and nuclear magnetic resonance spectroscopy. The oil in nuts contained cyclopropene fatty acids (CPFA) deter-

mined as silver nitrate derivatives of their esters. The values (area percentages) for the major fatty acids as methyl esters were 23.4% C16:0, 1.25% C16:1, 2.56% C18:0, 24.89% C18:1, 18.24% C18:2, 5.40% dihydrosterculic, 3.21% C18:3 plus C20:0 and 19.15% sterculic. The proportion of CPFA in the oil did not decrease upon cooking the nuts.

**756. S.K. BERRY, M.A. AUGUSTIN and L.K. HENG**

**Nitrate and nitrite content of Malaysian vegetables**

*Paper presented at the Seminar on Vegetables and Ornamentals in the Tropics, October 1982, Universiti Pertanian Malaysia, Serdang; 12 p. (mimeographed)*

Nitrate and nitrite have been used as curing salts in meat and meat products for decades. Nitrates also occur naturally in plants and drinking water, and its presence in soil is essential for the normal growth of plants. Its occurrence in a variety of fresh and processed vegetables have been reported. This study determined the nitrate and nitrite content of 10 vegetables, namely amaranthus, bitter gourd, broccoli leaves, cabbage, Chinese cabbage, egg plant, *kangkong*, radish, mustard leaves (*choy-sam* and *kai-choy*). Details of the method used were described. Nitrate levels were found to range from 146 to 2729 ppm, whereas the nitrite content of these vegetables was insignificant ( $< 1$  ppm). The toxicity of nitrate and nitrite was briefly discussed.

**757. R. WARWICK ARMSTRONG, M. JOCELYN ARMSTRONG, MIMI C. YU and BRIAN E. HENDERSON**

**Salted fish and inhalants as risk factors for nasopharyngeal carcinoma in Malaysian Chinese**

*Cancer Research*, 43:2967–2970, 1983

A case-control study of nasopharyngeal carcinoma (NPC) among Malaysian Chinese to test inhalants, salted fish consumption, and use of tobacco, alcohol, and nasal ointments as risk factors for the disease was conducted. Interviews with 100 cases and 100 controls indicated that salted fish consumption during childhood was a significant risk factor; childhood daily consumption of this food item compared to nonconsumption carried a relative risk of 17.4. Occupational exposure to smokes and to dusts was also significantly associated with NPC. The two risk factors (consumption of salted fish and exposure to smoke and/or dust) were independent of each other. There was no association between NPC and tobacco, alcohol, or nasal ointments.

**758. R.W. ARMSTRONG and ALICE CHAN SIEW ENG**

**Salted fish and nasopharyngeal carcinoma in Malaysia**

*Social Science and Medicine*, 17(20):1559–1567, 1983

The evidence for a hypothesis that eating salted fish is associated with nasopharyngeal carcinoma (NPC) was reviewed. The hypothesis was tested among Malaysian Chinese using a matched case-control design. The kinds of salted fish and patterns of use were also investigated in a control group comprising 100 Chinese, 50 Malay and 50 Indian

households. During 1980, in Selangor, interviews with 100 Chinese cases of NPC and 100 non-disease controls indicated that salted fish consumption during childhood was a significant risk, with an elevated risk for daily as opposed to less frequent consumption. Salted fish consumption during adolescence was a less significant risk, and current consumption not at all. There were 19 kinds of fishes reported as being eaten as salted fish by the 200 control households. There were marked differences between ethnic groups in preference for different kinds. Salted fish was hardly ever eaten daily by any household; weekly was a moderate frequency in all ethnic groups; less than weekly most common. There were no statistically significant differences between Chinese NPC case and non-disease control participants in kind of salted fish eaten. Results were the same when the data were analyzed by sex, subethnic group and income.

#### **759. J.T. AROKIASAMY**

##### **Preventing cancers**

*The Medical Journal of Malaysia*, 38(4):261–265, 1983

As a result of considerable work in cancer epidemiology, the aetiologic and risk factors of many cancers are being recognized, which if removed or modified may prevent cancers. The paper discussed some of these factors. The relationship between aflatoxins and the occurrence of hepatocellular carcinoma was reviewed. Studies have also indicated a consistent and specific causal association between hepatitis B virus and hepatocellular carcinoma. Other viruses known to have oncogenic potential are Epstein-Barr virus and Herpes simplex virus-2 and their association with nasopharyngeal and cervical carcinoma respectively. The role of chemical carcinogens in nasopharyngeal carcinoma has also been suggested, e.g. exposure to nitrosamines through consumption of salted fish at an early age. Of increasing interest is the relationship between smoking and cervical cancer. The type of diet we consume are also known to either predispose us to cancer or protect us from it. The involvement of alcohol consumption in the aetiology of cancer of various sites in the human body, particularly the mouth, pharynx, larynx and oesophagus was briefly reviewed.

#### **760. LIM HENG HUAT, DOMALA ZAKARIYA and KHOO HOON ENG**

##### **Lead concentrations in breast milk of Malaysian urban and rural mothers**

*Archives of Environmental Health*, 38(4):205–209, 1983

Evidence from animal studies have suggested that lead can be transferred from mothers to infants through breast milk. Since breast milk is the major constituent of the infant diet, excessive lead concentrations in milk may pose a health hazard to suckling infants, particularly when breastfeeding is now being actively encouraged. The objectives of the study was to compare lead concentrations in breast milk between two groups of mothers with assumed exposures to different air lead levels — one from urban Kuala Lumpur and another from the rural district of Kuala Langat, and to determine if lead absorption among urban maternal populations in the country poses a potential health hazard to infants through breastfeeding. Milk samples, which were collected from 89 urban and 91 rural mothers, were analyzed by flameless atomic absorption spectro-

photometry. The mean lead level in urban samples was found to be significantly higher than that collected from the rural mothers. However, the estimated daily lead intake of breast-fed infants was well below proposed tolerable levels. There also appeared to be no specific pattern in the milk lead levels at different periods of lactation. Various factors which might have contributed to the urban-rural difference in milk lead levels were discussed.

#### **761. MOHD. FUAD HJ. OTHMAN**

**Antinutritive compounds present in Malaysian beans and their effects on protein utilisation.**

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Food Science and Technology, 1983*

The content of antinutritive compounds, namely trypsin inhibitor, tannin and hemagglutinin, of the various beans available in the country was investigated. Biological evaluation was then carried out using Net Protein Utilisation (NPU) and true digestibility of the beans that were found to contain the highest levels of tannin and hemagglutinin. The results revealed that lentil and winged beans had the highest content of hemagglutinin and tannin respectively. Autoclaving improved the protein quality of lentil, but not the true digestibility. In winged beans, both protein quality and true digestibility were increased upon autoclaving.

#### **762. SABTURIAH SULAIMAN and SUHAILA MOHAMED**

**Minerals, phytates, trypsin inhibitors and haemagglutinins in petai (*Parkia speciosa*, Hassk.)**

*Paper presented at the 9th Annual Conference of the Malaysian Biochemical Society, September 1983, Serdang; 6p. (mimeographed)*

The alkaloid, tannin, nitrate and nitrite content of petai (*Parkia speciosa*) were determined by the authors in an earlier study (see abstract no. 714). The present work was to investigate trypsin inhibitors, haemagglutinins, phytates and minerals in these legumes. The content of the several minerals studied showed that they were present at a significant level to contribute to the daily requirements. The presence of phytates, trypsin inhibitors, and haemagglutinins were revealed, but the levels may be insignificant to cause toxicity in consumption by man.

#### **763. SUHAIMI SALLEH**

**Nitrite levels and their effect on selected pathogenic organisms**

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Food Science and Technology, 1983*

Fifteen samples of locally produced beef burger were evaluated for their nitrite levels, pH, *Coliforms*, *E. coli*, *S. aureus*, *Salmonella* and total count. The samples were obtained from various supermarkets around Kuala Lumpur and Kajang. Nitrite levels of the products were found to range from 100 to 165 ppm, and the pH varied from

6.4–6.5. Results obtained for the bacteriological counts were also presented. The effect of nitrite on the growth of *S. aureus*, *S. typhimurium* and *E. coli* at pH 7.0 and 5.0 at 37°C was also investigated.

#### 764. TENG SENG CHONG

**Food sampling activities and the enforcement of food legislation, Rembau–Tampin**

*Dissertation submitted to the University of Malaya in part fulfillment for the Degree of Master of Public Health, 1983; 156 p.*

The study was aimed at evaluating the food sampling and enforcement activities carried out by the health authorities in Rembau–Tampin Health District during Jan 1978 – June 1982 to monitor and ensure the safety of foods in the district. The duration between procurement of food and receipt of analyst's certificate, and aspects of the legal procedures involved in the prosecution of cases contravening the food legislations were also examined. A total of 1180 food samples belonging to 14 food groups were procured by the said authorities and subjected to a total of 4375 food analysis. It was found that 6.6% contravened the Sale of Food and Drugs Ordinance and Regulation 1952, with tea and tea-dusts heading the list of offending foods. The commonest offences were the presence in foods of non-nutritive sweeteners, non-permitted colours and excessive amounts of preservatives. Several recommendations were made to improve the food sampling and enforcement activities in this Health District and in the country in general.

#### 765. B.T. LIM

**Identification of water-soluble synthetic food colours in food**

*Paper presented at the 2nd ASEAN Workshop on Food Analytical Techniques, 19–24 March 1984, Surabaya, Indonesia; 12p. (mimeographed)*

A simple method for the detection of water-soluble synthetic colouring matters in food was described. In this method, the dyes were extracted from the food by using wool-dyeing technique, followed by separation of mixed colours by paper chromatography. The final identification and confirmation of the separated colours was based on the  $R_f$  values of paper chromatography and the absorption spectra when compared with that of the standards. Results obtained for the analysis of cordials, chilli sauce and shrimp paste were reported. In the first group, Tartrazine was detected in all samples of orange-coloured concentrates. For chilli sauce, the most frequently used colour was Sunset Yellow. A non-permitted food colour, Rhodamine B, was found in samples of shrimp paste.

#### 766. MAT ISA AWANG and LIM BON TONG

*Pewarna makanan (Food colours)\**

*Teknologi Makanan, 3(1):28–32, 1984*

Colouring is an important component of food and may be the first characteristic of the food that is being sensed by the consumer. Numerous types of colouring matter may be used to colour foods, to restore the original colour of the food that was lost

during processing or preparation of food. In general, food colours may be classed into 2 groups, namely the inorganic and organic oxides. Amongst the inorganic colours are carbon blacks, iron oxides, titanium dioxide and ultramarines. The organic colours may be further divided into 2 sub-groups, i.e. the natural and synthetic colours. The natural organic colours are derived from various animal or plant materials, and include annatto, saffron, turmeric, and beet red. The synthetic organic colouring matters are the most frequently used in foods. There are 23 types of colours in this group that are permitted for use by the current food legislations. However, a small proportion of manufacturers are still using colouring matters that are not permitted for use in foods. The paper gave a review of each of these groups of colours and their uses in foods.

\*Paper in Bahasa Malaysia

#### 767. SAYUWA AWANG

##### Determination of food additives in local hamburgers

*Dissertation submitted to Universiti Kebangsaan Malaysia in partial fulfillment for the requirement for the Degree of Bachelor of Science with Honours in Food Science and Nutrition, 1984*

The study was carried out to determine the amount of various food additives which were added in local hamburgers. Seven brands of locally produced and 3 brands of imported hamburgers were studied. Results obtained indicated that all local hamburgers contained certain amount of food additives such as soy flour (3.1 – 19.0%), cereal starch (8.9 – 28.3%), synthetic colours and condiments. There were significant differences in the amount of various additives used in hamburgers. Sensory evaluation showed that local consumers prefer hamburger which contain added condiment that provided a more spicy taste. However, local hamburgers which contained various additives were found to have lower nutritive value than the imported ones.

#### 768. ABDUL SALAM BABJI, A. AISHAH and AMINAH ABDULLAH

##### Nitrite contents of some foods in Malaysia

(in press)

Nitrate and nitrite are additives commonly used in meat curing for improvement of colour and flavour and for protecting the food against the growth of *Clostridium botulinum*. Nitrite can combine with secondary amines to form nitrosamines, which has been the cause of controversy for the use of nitrite as a food additive. Various foods suspected of containing added nitrite were purchased from local markets and supermarkets for analysis. The spectrophotometric sulphanilic acid method was used for the determination of nitrite content of these foods. Levels of residual nitrite in meat products were in the range of 14–53 ppm, processed pickled fruits and vegetables 7–81 ppm and salted dried fish 11–38 ppm. Results obtained indicated that the level of residual nitrite in most foods was below the permissible level of 200 ppm.

**769. SITI MIZURA SHAHID and TEE E SIONG**

**Lead : a review**

*(in press)*

With increasing industrialisation and urbanisation in Malaysia, it can be anticipated that lead intoxication will become an increasing problem in the country. The review was thus aimed at contributing towards meeting the increased demand for knowledge on the subject. The paper reviewed recent knowledge on the sources of lead exposure, its metabolism in the body, the indices which may be used to diagnose lead poisoning, the toxicological effects that may be brought about, and the control strategies to be considered in tackling the problem. Where Malaysian studies and data were available, especially in the area of lead content of local foods as a source of lead exposure, these were cited.

**SOCIO-CULTURAL ASPECTS OF FOOD AND NUTRITION**

**770. GEORGE JAMUH**

**Melanau infant feeding**

*Sarawak Museum Journal*, 7(7):221–225, 1956

The paper described the various types of infant foods that may be used by the Melanau to feed their babies. Mother's milk, wherever possible, was usually given. Ways to improve milk flow in the mother were described. If the mother dies very soon after delivery, other mothers especially those related to the mother, would be asked to help breast feed the infant. When breast feeding fails, the infants would be gradually weaned onto a suitable substitute which could be watery *bubor* or cooked mashed rice. A variety of other infant foods commonly used, with or without breastfeeding were described, such as sago jelly, tapioca, potato and cassava, boiled and mashed rice, powdered rice, unripe bananas, and *buah pulor*. Honey, sugar cane juice and boiled water with a pinch of salt added were also commonly given.

**771. MOHD. OMAR HJ. SALLEH**

**Infant feeding practices in the ANP Pilot Project area, Telok Datok, Kuala Langat**

*Dissertation submitted to the University of Malaya in part fulfillment for the Degree of Master of Public Health*, 1975; 48 p.

Breastfeeding practices and introduction of supplementary foods among 55 Malay infants were studied. The children were all in the 8 villages of the ANP area of Telok Datok, were born between 1.11.73 and 28.2.74, and were delivered by Government domiciliary midwives. Mothers of the infants were asked to recall what food was given to their children at one month of age till the age of one year and when supplementary foods were introduced. Results obtained were compared with those obtained from the baseline survey carried out in 1969.

**772. I. PATHMANATHAN**

**A study of current infant feeding practices in rural north Malaysia as a basis for determining needs in nutrition education.**

*Southeast Asian Journal of Tropical Medicine and Public Health*, 6(3):402–406, 1975

The study was aimed at identifying current infant feeding practices in a community to provide baseline data on which meaningful nutritional health education relevant to the needs of the particular area can be initiated. It was emphasized that nutrition education should take into account existing local feeding patterns as well as socio-economic, cultural, agricultural and commercial influences in the community. Particularly in communities where traditional practices are prevalent, health education should identify and encourage desirable practices, discourage undesirable ones and not interfere with harmless practices. The paper reported the infant feeding practices of 95 infants aged 3 months and 6 months in the rural, predominantly Malay district of Kubang Pasu, which is recently undergoing rapid economic development consequent to the introduction of improved agricultural techniques in rice farming. It was found that in both age groups, about half of the infants were wholly breast fed, a-quarter were partially breast-fed, and the remaining quarter were bottle-fed. Semisolids were introduced early in the form of commercial pre-packed cereals. In circumstances such as this where a still popular beneficial traditional practice like breast feeding might be a risk of losing popularity in the face of socio-economic development in the community, it was suggested that the most useful educational effort regarding infant nutrition would be to preserve breast feeding.

**773. CHRISTINE S. WILSON**

**Nutrition in two cultures: Mexican-American and Malay ways with food**

In: *Gastronomy — The Anthropology of Food and Food Habits*. Edited by Margaret L. Arnott; Mouton Publishers, The Hague, 1975; pp. 131-144

Mexican-Americans and Malays live nearly half the world apart, and few rural dwellers in either group are aware of the existence of the other, yet they share a remarkably similar inventory of foods and several food related customs which probably originated for both in similar ideologies. The dietary patterns and habits of these two groups were studied using participant observation and modifications of methods used by dietitians to determine food intake. The contrasts and similarities for their diets were discussed in detail. There include their daily foods, special foods, food intakes and nutrient status, customs and beliefs related to foods, as well as a discussion on the methods used in the study.

**774. F.R. BHUPALAN**

**Plan of action for the breast feeding campaign**

*Proceedings of the National Seminar on Breast Feeding in the Context of National Development*, 26 August 1976, Kuala Lumpur; pp. 119–125.

A National Committee has been set up under the Prime Minister's Department for the breast feeding campaign. This Committee shall be responsible for the implementation



of the campaign and for mobilising mass media and country support. The Committee consists of representatives from the relevant Government Ministries, organizations serving the private sector, women's voluntary organizations, Medical and Private Practitioners Associations, trade unions, mass media agencies and universities. This pattern of representation repeats itself with minor changes to State and District levels. It was emphasized that the campaign, while being coordinated at national level, must reach grass root level to achieve the desired results. The campaign is to be carried out in various phases, viz (a) preparatory phase during which the campaign will be launched, (b) implementation phase which includes motivation stage and operational stage, (c) maintenance phase, and (d) evaluation phase. The plans of action had taken pains to involve many non-governmental agencies and in particular women's voluntary organizations. The author called for the active participation of these agencies in the campaign.

#### **775. RAFIDAH AZIZ**

##### **Breast feeding from the socio-economic and health aspect**

*Proceedings of the National Seminar on Breast Feeding in the Context of National Development, 26 August 1976, Kuala Lumpur; pp. 113–117*

Breast feeding is the original and natural method of infant feeding that has been evolved ever since humans inhabited the earth. But with the process of modernization and social and economic development, there has evolved a new trend in which infants are being gradually fed on powdered milk that are concocted in various forms and sold in various varieties. This change in trend is related to various incorrect ideas, such as relating infant feeding with manufactured foods with "being modern and developed", "luxury living" and "convenience". It is however well established that breast feeding is the best method of infant feeding, and must be encouraged in any way possible. The various advantages of breast feeding from the health and nutritional aspects, as well as the socio-economic viewpoint were briefly discussed in the paper. The author called on the relevant authorities to reiterate clearly and frankly regarding the benefits of breast feeding, the immediate formulation and implementation of a 'code of ethics' on the advertising and promotion of milk and infant foods, the milk industries to adopt a responsible attitude so as not to exploit the mothers, and a breast feeding campaign with the full and official support of the Government.

#### **776. S.C.E. ABRAHAM**

##### **Towards a new role for the infant food industry**

*The family Practitioner, 2(8): 61–64, 1977*

In the last few years it has become increasingly evident that the massive advertising undertaken by multinational companies in the infant food industries has ironically brought about severe health hazards and malnutrition, termed Commercio-genic Malnutrition by the author, rather than contributed to higher health standards amongst little children. These health hazards have been particularly pronounced in the rural areas and amongst the poorer income groups of the urban areas as well. The multinationals concerned have embarked on massive advertising and promotional campaigns which have mesmerised the mothers, and unfortunately succeeded in causing a major

shift in the feeding habits of their babies. In order to reverse the trends, it will be necessary for us to agree upon and adopt a Code of Ethics which would minimise the abuses that have been brought about by irresponsible advertising and pricing of infant products. In the longer term, we would have to intensify our campaign to encourage breast feeding.

#### **777. PAUL C.Y. CHEN**

##### **People, behavioral patterns and disease problems**

*The Family Practitioner*, 2(8):36–39, 1977

In the behavioral conceptual model of health education, behavioural pattern is placed first in the chain of events which can lead from health to disease. If such a model is acceptable, it implies that primary health education must be directed at those behavioural patterns that predispose to disease. There are obviously numerous behavioural patterns that one is familiar with which would predispose to diseases. The paper discussed some of the more important examples to illustrate the role of behavioural patterns in the causation of disease and the consequential need for health education directed at such behavioural patterns. In relation to nutritional diseases, behavioural patterns in many areas of the developing world is a major contributory factor to the prevalence of protein-calorie malnutrition. Such dietary restrictions may even cause the sick individual to be denied the very food he requires. Examples of behavioural patterns in relation to communicable and non-communicable diseases, and to medical care were also discussed.

#### **778. MARY LEE**

##### **Modern influences on the breastfeeding decision**

*The Family Practitioner*, 2(8):64–67, 1977

Some of the factors that could contribute towards influencing a mother's decision on breast feeding and its success were discussed. One of the most important of such factors is the information and encouragement a mother receives, or fails to receive, when she needs it most. Such information, which are mostly non-medical, include the technique of breast feeding. Some of the negative influences on breast feeding discussed include old wives' tales about diet and elements secreted through the mother's milk, the fear of losing one's figure, the fear by working mothers that breastfeeding is impossible to manage, the hospital practice of separating the mother and newborn for the first 24 hours, the shyness of breastfeeding babies in front of others, the lack of confidence in their own efficiency in breast feeding, and the belief that breast feeding is inconvenient. Some of the positive influences which can help towards successful breastfeeding are assistance and support from Breast Feeding Associations, a supportive husband and family, and the physician who makes a point of spending a few minutes to encourage his patient to breastfeed her forthcoming infant. The author called for combined efforts towards the restoration of breastfeeding as every infant's basic right.

**779. M.K. RAJAKUMAR**

**The hospital factor on breast feeding failure**

*The Family Practitioner*, 2(8): 67–68, 1977

Preliminary findings of a survey on the influences of institutional facilities on mothers in the post partum period in hospital that affect breast feeding were reported. It was observed that although advice on breast feeding is now given, there is a conflict between advice and practice so that the advice has become ritualistic. There is a lack of follow-up on advice, and the mother is not helped and encouraged to breast feed and to overcome her initial disappointments and difficulties. It was also pointed out that the artificial milk food industry exercises a negative influence through maternity ward staff by provision of milk samples to maternity units and by visits of their sales staff to the mothers. It was emphasized that the hospital factor could be an important cause of failure of the mother to breast feed.

**780. RUBY ABDUL MAJEED**

**Education in breast feeding**

*The Family Practitioner*, 2(8):47–48, 1977

Whilst it is true that there is a global trend in artificial feeding, it cannot be denied that certain conditions in developing countries (such as concentration of population, new wealth and changing attitudes) provide a receptive market for the infant milk industry. The important factors for the decline in breast feeding were pointed out. There is therefore an urgent need to have an intensive programme of education in breast feeding for doctors, nurses, midwives and the general public. Such programmes should emphasize the benefits of breast milk to the infants as well as to the mother.

**781. TEOH SOONG KEE**

**Breastfeeding — the natural immunisation**

*The Family Practitioner*, 2(7):25–26, 1977

Breastfeeding has long been recognized to give infants resistance to bacterial and viral infections, not only of the gut, but also of the respiratory tract. This is even more pronounced in the developing countries where the risks of infection in infancy are considerably higher. As a relatively cheap source of protein, breastmilk also counteracts malnutrition which in turn depresses resistance to infection. The paper discussed briefly the action of the various immunising agents present in breast milk, including immunoglobulin A (IgA), various antibacterial factors, complement C<sup>3</sup> and C<sup>4</sup>, antiviral substances, and cellular and phagocytotic activity. Infections that may be prevented by breastmilk are gastro-enteritis, respiratory tract infections, otitis media, neonatal septicemia and thrush.

**782. FREDERICK C. COLLEY**

**Traditional Indian medicine in Malaysia**

*Journal of the Malaysian Branch of the Royal Asiatic Society*, 51(233):77–109, 1978

The paper was aimed at providing an introduction to the origins and practice of some of the medical concepts that exist in the Malaysian Indian community, for which little information is available. The historical aspects of Indian immigration into British Malaya, the origins and development of Indian medicine, and the practice of Indian medicine in Malaysia were discussed in some detail. This abstract will deal only with the section on customs and traditions related to marriage and childbirth, of relevance to food and nutrition. Indians are said to view diet and health as being related. Various foods are considered to be "hot" or "cold" and a proper diet balances these qualities. This is particularly important during illness or stress. Some examples of dietary practices during pregnancy, confinement and lactation were discussed in the paper.

**783. ABDUL MALIK ABDULLAH**

**Problems in the maintenance of breast-feeding as a custom**

*Jurnal Perubatan UKM*, 1(1):61–63, 1979

Concern over the decline of breastfeeding practices in developing countries has been voiced by many governments and international agencies who have seen in this trend a growing threat to the nutritional status and health of the infant. This decline, which first started with industrialisation about 100 years ago, has insidiously permeated the developing world as a result of economic pressures, changes in social and cultural values, the aggressive and subtle advertising by milk companies and by the inadequate advice given to mothers by doctors and other health workers. The paper discussed briefly some of these factors, and suggested some measures for preventing this decline in breastfeeding practices.

**784. S.C.E. ABRAHAM**

**Problems connected to infant formulae feeding versus breast feeding**

*Report of the Seminar on Health, Food and Nutrition, 15–20 September 1979, Penang*; 14 p. (mimeographed)

Research has proved that the best food for any child, whether rich or poor, is mother's milk. It is not only rich in nutritional value and generally easily available, but is available without cost. The practice of breast feeding which has been universal in traditional cultures, has been on the decline in developing countries including Malaysia. Various studies carried out were briefly reviewed to illustrate this decline in the country. Another undesirable practice emphasized was the widespread use of pre-cooked cereals. This trend towards artificial feeding arises from a combination of poorly understood social and economic factors. The process of "modernization" has led to new social norms whereby artificial feeding has been identified with an image of sophistication, convenience and aesthetic cleanliness. However, one of the major factors may be the unethical advertising and promotional campaigns by infant formula manufacturers, even in areas where bottle feeding is neither economically nor

hygienically feasible. Thus, these multinational companies have ironically brought about severe health hazards and malnutrition which are particularly pronounced in the rural areas and amongst the poorer income groups of the urban areas as well.

**785. PAUL C.Y. CHEN, RAJA AHMAD NOORDIN and LEE YUET NGOR**

**Food beliefs of rural Malay women of Trengganu**

*The Medical Journal of Malaysia*, 34(2):100–107, 1979

The paper reported a study of 216 Malay women in various rural communities in Trengganu regarding their traditional food beliefs. The women were asked for their responses to a list of different foods. These were classified according to whether they were perceived to be (a) highly beneficial, (b) beneficial, (c) neutral or of uncertain value, or (d) taboo. Results obtained for toddlers (1–4 years old), expectant mothers, and postnatal mothers were separately tabulated and discussed. Some avoidance of food amongst the young children was observed, particularly some kinds of vegetables or fruits as well as hot foods (*makanan pedas*). These foods were generally also being avoided by expectant women. Such food avoidances were however thought to be of relatively limited extent, and since in many instances alternatives could usually be found, they were considered to be of no serious consequences. On the other hand, postnatal women, on the whole, appeared to be the most constrained amongst the three groups in terms of food taboos. Since most of the taboo foods for this group of women were fruits, vegetables, fish, meat and eggs, they would be deprived of vital sources of vitamins, minerals and proteins. As they were in a particularly vulnerable condition, such avoidances were thought to be of more serious consequences. With regards to beneficial foods, most of the foods classified as beneficial were also nutritious foods, although not all nutritious foods were classified as beneficial. Of special significance was rice, which was considered by nearly all households as high beneficial for all the three physiological groups. The implications of findings from the study for the socio-economic development of communities were briefly discussed.

**786. N. IYNGKARAN**

**Perspectives of infant nutrition: breast milk a neglected asset**

*Report of the Seminar on Health, Food and Nutrition, 15–20 September 1979, Penang*; 7 p. (mimeographed)

It is of overriding importance to emphasize the need to promote good nutrition by means of breast feeding. It is clear that the promotion of breast feeding would go a long way towards reduction in continuing mortality and morbidity from malnutrition and diarrhoea. The virtues of breast feeding stem both from its nutritional composition and its immunological properties. Modern science has provided explanation for the observations of our fore fathers that breast feeding protected babies from infections. It was emphasized that the infant has the right to live and the right to realize the full potential he is endowed with at birth and this cannot be challenged by anyone. This right to breast milk supercedes the mother's right to deny the infant breast milk unless there are strong medical reasons. The question of whether a mother should breast feed therefore does not arise at all. Considerations should instead be given to the minimum period of breast feeding, and how we can maximise the opportunities

for mothers to breast feed her infant for this period of time. Current evidence suggests that infants should be breast fed for 3–6 months. In order to maximize the opportunities for mothers to breast feed, the author emphasize the need to tackle the factors responsible for the decline in breast feeding, namely the changing life style of the modern mothers, the availability of alternatives to breast feeding, and the aggressive promotion efforts of the infant industry.

#### 787. MICHAEL KHOR KOK SENG

##### Social and preventive aspects of paediatrics

*Report of the Seminar on Health, Food and Nutrition, 15–20 September 1979, Penang; 8 p. (mimeographed)*

The paper discussed some of the factors operating to compromise the life and health of a child right from birth, during infancy and the toddler stage, through the early formative years and towards puberty and adolescence. Malnutrition is said to be a social disease; it is a symptom of poverty and can only be effectively eradicated when more of our population have a decent standard of living. Furthermore, malnutrition is often compounded by interrelated illnesses. Another equally potent factor in affecting the health of young children is the lack of education of parents, leading to drastic, often tragic circumstances. Misconception regarding diseases, ignorance of infant nutrition and health practices were some examples cited. Overcrowding, childhood accidents and poisoning, child battering, and infectious diseases were other factors discussed. The paper emphasized on identifying the social factors which play an important part in childhood disease and some concrete steps which may be taken to minimise this.

#### 788. MAIMUNAH ISMAIL

##### Socio-economic factors associated with the adoption of Applied Nutrition Programme (ANP) by households in a Malaysian mukim

*Pertanika, 3(3):133–140, 1979*

The study was carried out to determine the extent to which socio-economic factors affect the adoption of innovations associated with the Malaysian ANP, implemented in 6 villages in Mukim Tanjung Dua Belas, Kuala Langat. The socio-economic factors were regarded as the independent variables which influenced the ultimate adoption of practices spelt out by the ANP, taken to be the dependent variables. Correlation analyses were carried out and the size of the correlation coefficients served to evaluate the degree of association between these variables. A host of socio-economic variables were examined, and included age, education attainment of respondent and spouse, family size, occupation, family income, and size of cultivated land. The dependent variables studied were the 15 recommended practices, and they included poultry and dairy cattle raising and other agricultural practices, sending children to “under-7 clinics”, breast-feeding practice and other health and food practices, and environmental sanitation. It was found that social factors contributed more significantly towards the adoption of ANP practices than economic factors. Although the findings can only be generalized as they pertain to the mukim under study, it was felt that they could be useful in providing insights into the problems of adoption of ANP practices elsewhere in the country.

#### 789. OTHMAN HASSAN

##### **Protein foods in Malaysia — consumers' attitude and acceptance**

*Proceedings of the Symposium on Protein Rich Food in ASEAN, Kuala Lumpur, 12–13 July, 1979*; edited by Zahara Merican, Y.L. Yeoh, S.K. Berry, E.C. Chuah, and G.C. Ch'ng; pp. 159–162

Results of a preliminary survey conducted in 22 households in Petaling Jaya to determine the Malaysian consumer's attitude and acceptance to protein foods were reported. Protein foods were classified into: traditional (produced mostly by fermentation processes and consumed in small amounts as condiments and appetisers, such as soysauce, fish sauce, prawn sauce, prawn paste, etc.), conventional (including fish, prawn, meat, poultry, egg, milk and cheese), and novel (new protein rich foods manufactured by modern industrial techniques, such as textured vegetable protein). For each of three classes of foods, those items that were most preferred by the respondents were discussed.

#### 790. ZAITUN YASSIN

##### **Why you should breast feed your baby**

In: *For the Well-Being of Malaysian Children*, edited by Eleonora Sanders, Mary Tay and Zaitun Yassin; Universiti Pertanian Malaysia, 1979; pp. 36–40

Children of today are increasingly being deprived of a natural resource, that is, their mother's breast milk, at the start of their lives. Losses of million of dollars is going virtually unnoticed in many of the poor and developing countries of the world. This paper discussed some of the advantages of breast feeding and urged that this valuable natural resource should not be wasted. Breast feeding is "as normal and natural as breathing". Aside from the various nutritional, immunological and psychological advantages of breast feeding, the economic, convenience and safety aspects were also pointed out. In summing up, it was said that "breast feeding adds enrichment and enjoyment to the life of every member of the family".

#### 791. S.T. CHEN

##### **Breast feeding and hospital practices**

*The Medical Journal of Malaysia*, 34(4):325–328, 1980

Human milk is best suited to the human infant and there is no substitute for it. Although some present day infant formulae attempt to overcome some of the nutritional difficulties associated with cow's milk feeding, the cost of such formulae is too high for the majority of people living in Malaysia. Besides, manipulation of infant formulae may lead to new problems. It is therefore essential that all newborn infants should be breast-fed as far as possible. A few concerted efforts have been carried out to reverse the observed decline in the incidence and duration of breast feeding in the country. However there has been little change in most hospital practices to actively support breast feeding although studies have shown that minor modifications in the function and regimen, of hospital requiring little or no additional expense, could result in an increase in the incidence and/or duration of breast-feeding. This paper suggests some

such modifications to promote breast-feeding. The author urged that hospitals practices should plan their activities with breast-feeding in mind. All categories of staff should encourage, motivate and support mothers to breast-feed, such as during antenatal clinic sessions, in puerperal care, in postnatal wards, in children's hospitals, and the setting up of special care nurseries for sick or premature babies.

#### 792. AZIZAH ABDULRAZAK

*Satu amalan penyusuan ibu di kalangan masyarakat Melayu di Daerah Petaling (A study on breastfeeding practices among Malay community in Petaling District)\**

*Project report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Science (Human Development), 1981; 67 p.*

A study of breastfeeding practices among Malay community was conducted in 10 Maternal and Child Health Clinics in the Petaling District of Selangor. 100 mothers who attended these clinics for their postnatal visits were the samples of this study. The prevalence of breastfeeding, the duration of feeding, factors influencing the practice, and food beliefs during breast feeding were discussed. The practice of supplementary feeding of these mothers was also discussed.

\*Report in Bahasa Malaysia

#### 793. KHALILAH ABU HASSAN

*Amalan pemakanan murid-murid di sekolah-sekolah yang terpilih di kawasan Kelang, Selangor (Nutrition practices of children in selected schools in Kelang area, Selangor)\**

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Science (Human Development), 1981*

A study was conducted to compare the nutrition practices of 131 preadolescent (standard 6) and 216 adolescent (form 4) children in 8 schools in Kelang, Selangor. The students were divided into three groups based on the income level of their parents. Breakfast, lunch and dinner habits of the subjects were studied in relation to level of income, level of education and the time they went (or returned from) school. The children's food habits in school were found to be influenced by the amount of pocket money, income level, the level of student's education, and the type of food sold in school canteens. The relationship between these variables and nutrition knowledge was also investigated. Differences observed between the adolescents and preadolescents were discussed.

\*Report in Bahasa Malaysia



#### 794. LENORE MANDERSON

##### Traditional food beliefs and critical life events in Peninsular Malaysia

*Social Science Information*, 29(6):947–975, 1981

Traditional food beliefs during some critical life events of Malaysians were studied. Data were collected from interviews of 278 women, the majority of whom were Malays, from 5 states in Peninsular Malaysia. It was observed that the majority of food restrictions were imposed during the periods of sickness and physiological change, and relate to *hot-cold* and other classifications of food (*windy*, *itchy*, *poison* and *sharp* foods). Whilst the excessive consumption of certain classified foods may cause ill health, *hot* and *cold* food may be used to ameliorate discomfort or to treat illness, usually in accordance with the principle of the treatment of opposites. Biological and physical changes were thought to affect the *hot-cold* balance of the body and were thus treated by adjustment of the diet to redress the balance. The paper discussed in some detail the dietary (as well as behavioural) practices during pregnancy, confinement, menstruation, and circumcision. Women were found to be particularly affected by food restrictions. Dietary constraints were marked during the puerperium but traditionally the diets of pregnant and menstruating women were also restricted. Men, on the other hand, were relatively free from such constraints, although Malay boys were also subjected to proscriptions, similar to those observed by newly-delivered mothers, following their circumcision. The implications of such food restrictions were also discussed.

#### 795. LENORE MANDERSON

##### Roasting, smoking and dieting in response to birth: Malay confinement in cross-cultural perspective

*Social Science and Medicine*, 15B:509–520, 1981

In humoral medical theory, physiological changes including pregnancy and confinement are known to alter the humoral balance of the body. Behavioral and dietary precautions must be invoked to protect the women's health in a state of physical as well as magical vulnerability. The most part of the paper described the practice of such restrictions by Malay women following parturition. Most of the data presented were collected from studies of 278 women from 5 states of Peninsular Malaysia, carried out from 1978 to 1979. According to humoral pathology, Malay women believe that pregnancy is a hot state, and with parturition heat is lost and the woman moves to a state of excess cold. Hence during the postpartum period of 40–44 days, care should be taken to restore the woman to a state of equilibrium. Her diet and behavior is thus prescribed to this effect. The author described in some detail some of such behavioral practices, especially puerperal roasting and smoking. In addition, there were extensive dietary restrictions. Cold foods, including most fruits and vegetables were generally avoided, whereas hot foods were prescribed. Numerous other foods, classified as cold foods, oily foods, sharp foods, itchy fishes and windy foods were also frequently encountered as dietary taboos. Similar behavioral and dietary restrictions were seen in other cultures in Southeast Asia, such as amongst Chinese, Indians, Thais, and Burmese, as well as other parts of the world. Finally, the paper examined these confinement practices cross-culturally to explain the rationales of such practices.

#### 796. LEONORE MANDERSON

##### Traditional food classifications and humoral medical theory in Peninsular Malaysia

*Ecology of Food and Nutrition*, 11:81–93, 1981

Humoral medical theory is believed to have reached Malaysia through Unanic, Ayurvedic and Chinese medical traditions. Today, prime evidence of this theory remains in the classification of foods as *hot* and *cold*, and less frequently as *wet* and *dry*, that relate to the reputed effects of the foods on the body. Additionally, foods may be classified as *windy*, *sharp*, *itchy* and *poison*. Foods may be prescribed or avoided according to diagnosis of an individual's health status or physiological state. This paper examined the extent of knowledge of such traditional food classifications and associated dietary prescriptions in contemporary Malaysia. Data were derived from studies of 278 women of the three major ethnic groups, from 5 states in Peninsular Malaysia, carried out in 1978–1979. It was observed that a total of some 100 separate foods were classified as *hot* by respondents, and there was considerable consensus regarding the general application of this classifier. *Hot* foods including animal protein foods, fried foods, condiments and spicy dishes, herbal preparations and a few local fruits, notably durian and rambutan. Another one-hundred odd foodstuffs and preparations were classified as *cold*, most of which were fruits and vegetables. In both these classes of foods, there was general agreement across ethnicity regarding initial classification, grading and the effect of the food on the body. It was also observed that these classifications could be predicted by their nutritive value, since those foods deemed cold tended to have a higher water content, less protein, lower fat, lower carbohydrate content and fewer calories. In addition, 90 foods were classified as *windy* foods, 51 as *sharp* foods, 87 as *itchy*, and 93 were said to be *poisonous* foods. Aside from these, many foods were neither classified as *hot* or *cold* or necessarily ascribed balanced, bland or neutral properties.

#### 797. POH SIANG CHOO

##### Dietary patterns of infants and toddlers in Kampung Tun H.S. Lee, Sentul Pasar, Kuala Lumpur

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Science (Human Development)*, 1981

The study investigated the dietary patterns of infants and toddlers and attempted to identify the factors in the patterns that may contribute to nutritional problems among the children. Results obtained revealed that only 45.2% of the mothers of these children had initiated breast feeding, and by the 3rd month about 60% of them had terminated breast feeding. Commercially prepared precooked cereals were commonly used for feeding infants. The toddlers' feeding patterns were not satisfactory either. They did not receive any form of diet which was specially prepared. Certain foods were denied to them because of customary food beliefs. The traditional practice which assumed that toddler being small in size, needs only small quantities of adult foods, further deprived the children from getting adequate nutrition.

**798. PRABHA JOGINDER SINGH, CHEW GUAT EE and REBECCA JOHN**

**Infant health care practices – a study in three communities**

*The Medical Journal of Malaysia*, 36(3):166–170, 1981

A cohort of 90 infants, mostly Malays, born in March in 1979 in Kedah, Pahang and Malacca were followed up to determine the feeding practices, preventive health care and medical care practices during infancy. It was observed that a high proportion of the infants studied continued to be breastfed until six months. Compared with the findings reported by other workers for urban areas, the incidence of breast feeding in the rural areas studied was said to be higher and the duration of breast feeding was longer. It was however found that the practice of early introduction of solids was similar to that practiced by urban mothers. It was felt essential that mothers needed to be made aware of delaying introduction of solids, as early as during the antenatal period. The remaining of the paper dealt with the preventive health care and medical care practices of the mothers of these infants.

**799. AZIZAH AHMAD**

***Amalan pemakanan di kalangan penuntut-penuntut wanita UPM (Nutrition practices amongst female students of the University of Agriculture Malaysia)\****

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Science (Human Development), 1982*

Nutrition practices amongst 70 (about 8%) female students of the University of Agriculture Malaysia were studied with regards to food habits, choice and intake of foods. Interviews were conducted to collect the required data, which included a 24-hour recall for food consumption. Results obtained were analysed in relation to knowledge on nutrition, body weight, and ethnic grouping. Adequacy of consumption was compared to recommended dietary allowances.

\*Report in Bahasa Malaysia

**800. AZIZAH CHE' MAT**

***Corak amalan pemakanan kanak-kanak pra-sekolah di Kampung Melayu Ampang, Kuala Lumpur (Food habits of preschool children in Kampung Melayu Ampang, Kuala Lumpur)\****

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Science (Human Development), 1982*

The pattern of food habits among 60 Malay preschool children in Kampung Melayu Ampang, Kuala Lumpur was investigated in relation to different socio-economic status, level of mother's nutritional knowledge, mother's occupation and the influences of advertisement. Data were collected through interviews. Results obtained indicated that food habit patterns of these children were positively influenced by the family monthly income, mother's level of nutritional knowledge, and working mothers. Advertisement was observed to influence negatively the snack food intake of the subjects.

\*Report in Bahasa Malaysia

## 801. S.T. CHEN

### Breast-feeding versus bottle-feeding

*Proceedings of Food Conference 1982, 16–20 May 1982, Singapore*; edited by C.Y. Theng, W.L. Kwik and C.Y. Fong; pp. 264–266

Breast-feeding and bottle-feeding were compared under two headings: comparison of the composition and bioavailability of breast and cow's milk; and the effects of the two forms of feeding on growth, development, infections, allergy and child spacing. Human milk is said to be best suited to the human infant and there is no substitute which is equal to it. Nutritionally it provides optimal nourishment including brain growth with minimal stress upon the immature systems of the young infant. Immunologically it protects the infant against infections and allergy during the period of physiologically transient immune deficiency state. Early, frequent and prolonged breast feeding fosters maternal-infant bonding which is essential for the optimal development of the infant. The child spacing effect of breast-feeding is important in developing countries. Although some present day infant formulas overcome some of the nutritional difficulties associated with cow's milk feeding such as higher content of protein and phosphorus and lower content of lactose and polyunsaturated fatty acids, but the cost of such formulas is too high for the majority of people living in developing countries. Besides, manipulation of infant formulas may lead to new problems such as vitamin E deficiency anaemia in preterm infants fed on high polyunsaturated fatty acid infant formulas. Therefore it is essential that all newborn infants, as far as possible, should be breast fed.

## 802. LENORE MANDERSON

### Infant feeding practice, market expansion, and the patterning of choice, Southeast Asia, 1880–1980.

*Proceedings of Food Conference 1982, 16–20 May 1982, Singapore*; edited by C.Y. Theng, W.L. Kwik and C.Y. Fong; pp. 267–273

Some of the social, structural and economic (especially commercial) factors which have influenced infant feeding practice over the past century were examined. The marketing of milk into Southeast Asia was traced from the time of the establishment of permanent European settlements in the region. By around 1910, fierce competition had developed amongst milk companies, represented by all major industrialized milk-producing countries. The frequency of advertising reflected the intensity of this competition. Besides direct advertising, corporations were also promoting their products through government and voluntary agency infant health programs. Soon the medical community drew attention to the association between the high infant mortality rates and artificial feeding. However, tin and powdered milk were said to be provided to mothers through government health clinics, such as the maternal and child health clinics. This was thought to have affected attitudes towards infant feeding practice, encouraging the use of such products. Ideas regarding infant weight, the female figure, and motherhood had also influenced women's decision-making regarding method of infant feeding. In addition, rapid economic and structural changes had had a profound impact on women and the family, creating an environment which discouraged prolonged lactation and which left many women with little choice but to bottle feed.

It was however pointed out that the paucity of data of changing infant feeding practice in Southeast Asia precludes our understanding of the relative impact of these various factors or of the processes by which individual women decide the method of feeding their infants.

**803. LENORE MANDERSON**

**Bottle feeding and ideology in colonial Malaya: the production of change**

*International Journal of Health Services*, 12(4):597–616, 1982

The paper was to provide documentation of the historical developments that led to the wide acceptance of bottle feeding in Colonial Malaya (today Peninsular Malaysia and Singapore). Condensed milk was already marketed in the country from the late 19th century. Infant formula was available from the turn of the century and was widely advertised, first in the English-language press and later also in the vernacular presses. At the same time, other social and cultural factors served to discourage breast feeding. There were changes in ideas regarding ideal body weight for both women and infants, and regarding infant care and diet; these ideas were presented in the mass media. In addition, maternal and child health clinics, established in the 1920s to reduce the high infant mortality rate, both propagated popular beliefs about infant weight and supplied milk and educated women to artificially feed their infants. It was thus shown that industry, the media, and the medical profession together have promoted, if not always intentionally, bottle feeding rather than breast feeding. Bottle feeding as an ideal, if not a reality, was thus well established before the intensive promotion of milk products by multinational corporations that followed the political independence of the Colony.

**804. V. SUPRAMANIAM and A. SUPRAMANIAM**

**Survey of family planning and breast-feeding practices in a military community**

*Journal of the Malaysian Society of Health*, 3(1):18–24, 1982

A questionnaire survey on breast-feeding (and family planning) was carried out among 100 wives of Malay servicemen who had a live birth in 1979 and registered in the Ministry of Defence Family Clinic. It was found that 64% of the infants were being breast-fed. However, 32% of these were supplemented by bottlefeeds since birth. Solid foods were introduced too early in life – 82% during the first 3 months of life. The most popular solid food was Nestum. Only one mentioned giving a home-made solid food.

**805. E.S. TEE, M. KANDIAH and HANIS HUSSEIN**

**Food consumption and habits in rural Malaysian villages: recent findings and some thoughts for improvement**

*Report of the 4th ASEAN Food Habits Workshop, 29 November – 4 December 1982, Yogyakarta, Indonesia*; 11p.

Findings of studies in Mersing, Johore (1981), Bengkoka Peninsula, Sabah (1982) and Baling, Kedah (1982) were reported. A total of 301 households were visited and

enquiries made into the food beliefs and practices amongst the infants, pre-school children and women during pregnancy, post-partum and lactation. The consumption patterns of foodstuffs in these households were determined and the amounts quantitated. The post-partum women were seen to be the group with the most serious food avoidances and restrictions. Although there appeared to be less food taboos during pregnancy and lactation, these women did not supplement their diets with the essential foods to cater for the additional nutritional needs during these crucial periods of their lives. There were also no serious food taboos for the young children, but their nutritional needs did not get much attention either. Although some of the respondents had a fair knowledge of the need for nutritious foods, food consumption patterns of the households indicated a monotonous dietary intake and a lack of the essential foods. Findings obtained point to the need for serious thoughts on intervention and remedial actions. Some possible measures for improvement were briefly discussed.

#### **806. WONG MEE LIAN**

##### **A comparative study of breastfeeding in the two main ethnic groups in the Ulu Langat and Gombak districts in Selangor**

*Dissertation submitted to the University of Malaya in part fulfillment for the Degree of Master of Public Health, 1982, 134 p.*

The incidence and duration of breastfeeding in relation to age, parity, income and occupation was studied and compared among 48 urban and 49 rural Malay mothers, and between the former and 51 urban Chinese mothers. The views of the mothers on breastfeeding and their reasons for not breastfeeding or discontinuing breastfeeding were studied. The study also aimed at assessing the awareness of the mothers towards the advantages of breastfeeding. These mothers were interviewed while attending the antenatal sessions or child health sessions in the MCH clinic, midwife clinic or sub-health clinic of the Ulu Langat and Gombak districts. Incidence of breastfeeding was said to be very high among the rural Malay mothers, low in the urban Chinese, and 'quite high' among the urban Malay mothers. Rural Malay mothers were seen to have breastfed for the longest period, followed by urban Malays. No association was observed between the incidence of breast feeding and age, parity, occupation, income and educational status of the rural Malay. However, it was the low income urban Malay mothers who breastfed longer. The Malays had more knowledge of the advantages of breastfeeding, whilst a shockingly high proportion of the urban Chinese were said to be ignorant of the fact. It was emphasized that education on breastfeeding should be promoted in the health clinics and attention focused on clarification of doubts and misconceptions of breastfeeding.

#### 807. AZIZUN ABDULLAH

*Pengetahuan, sikap kepercayaan dan amalan terhadap makanan dan pemakanan di kalangan ibu-ibu mengandung bangsa Melayu di Daerah Kota Bharu, Kelantan*  
(Food and nutrition knowledge, attitude, beliefs and practices among Malay pregnant women in the District of Kota Bharu, Kelantan)\*

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Science (Human Development), 1983*

One hundred respondents, i.e. about 12% of the total number of pregnant mothers registered at the health centres were randomly selected for the study. Information on food and nutrition knowledge, attitude, beliefs and practices of these women were obtained using questionnaires. Data collected were analysed in relation to several socio-economic variables. Positive significant correlations were observed between food and nutrition knowledge, attitude, beliefs and practices with age, family income, total food expenditure, family size and the number of children.

\*Report in Bahasa Malaysia

#### 808. JARIAH MASUD

*Remaja sebagai pengguna (Adolescents as consumers)*

*Pertanika*, 6(2):81–90, 1983

The main objective of the study was to investigate the expenditure pattern and the consumer behaviour of adolescents. The sample comprised 1,166 form four students from 10 schools in Perak, Selangor and Negri Sembilan. The results of the study indicate that the average amount of money received by the respondents was \$21.47. The average expenditure was: food \$8.88, reading materials \$8.68, entertainment \$5.35 and others \$12.21. There was a significant difference in the amount of money received and spent between males and females. Female respondents tended to be more careful in their spending as compared to males. However, they bought sweet foods and snacks more often than males who often bought filling foods.

#### 809. RUSLI NORDIN

**An inquiry into some aspects of food beliefs and food practices among Malay antenatal attendees on Penang Island**

*Dissertation submitted to the University of Malaya in part fulfillment for the Degree of Master of Public Health, 1983; 118 p.*

Food beliefs and practices among 94 Malay antenatal clinic attendees at 4 health facilities on Penang Island were studied. The study was based on 16 food items, grouped into energy-providing (rice, bread and sweetened condensed milk), protein providing (meat, eggs, Chubb Mackerel, cockles and salted fish) and mineral/vitamins-providing (spinach, kangkong, tapioca shoot, gourds, pineapple and papaya) and others (coffee and black pepper). Using the questionnaire-interview approach, response to food beliefs was based on a simplified scale of beneficial, neutral or harmful, whilst

for food practices, a yes or no response was obtained. Results were presented separately for the non-pregnant, pregnant and post-partum periods. Findings were discussed in relation to other similar studies in Peninsular Malaysia. The need for health education for these Malay antenatal attendees with regards to food beliefs and practices during pregnancy and confinement was emphasized.

**810. ZANARIAH JIMAN and MD. YUNUS JAAFAR**

*Kajian arahaliran pengambilan makanan penduduk di kawasan-kawasan bandar dan luar bandar di Pendang, Kedah (Study of the food intake trend of urban and rural dwellers in Pendang, Kedah)\**

*Report No, 270, Food Technology Division, MARDI, Serdang, 1983; 41 p.*

A survey of the food intake trend of 303 subjects (household occupants) in Pendang, Kedah was carried out. The intake of foods in the various food groups was studied in relation to ethnic groups, household income, household size, education level of the heads of household. Findings obtained for the urban and rural households were compared. The report presented findings on the frequency of consumption of food items, the average cost of foods, sources of foods, and the consumption of processed foods.

\*Report in Bahasa Malaysia

**811. ZANARIAH JIMAN**

**Infant feeding practices in Segamat, Johore**

*Report No. 271, Food Technology Division, MARDI, Serdang, 1983; 14 p.*

Poor infant feeding practices and their consequences are one of the world's major problems and a serious obstacle to social and economic development. A study of infant feeding practices of several urban and rural areas of Segamat District was carried out. This is part of a larger study of the food intake trend of the population in the district, carried out in 370 households. Out of this total, 36 households from the town area, and 44 in the kampongs were found to have children below the age of 2 years. These were taken as sample of the study of infant feeding practices. The prevalence of breastfeeding was studied in relation to monthly household income, educational level of the mothers, and whether the mothers were working or not. Supplementary feeding practices of these children were also investigated.

**812. LENORE MANDERSON**

**'These are modern times': infant feeding practice in Peninsular Malaysia**

*Social Science and Medicine*, 18(1):47–57, 1984

This paper examined key sociological factors that might predict the frequency and duration of breastfeeding and weaning patterns. The data analysed were collected during semi-structured interviews with 278 women presenting at Maternal and Child Health Clinics in five states in Peninsular Malaysia from 1978–1979. The findings



appeared to suggest that whilst the majority of women still breast fed, their propensity to do so, and to do so for a prolonged period, appeared to relate to and thus be influenced by the general social and cultural environment. Standard socio-economic indices such as income, education and the occupations of both the woman and her husband did not seem to relate directly to infant feeding and were generally not statistically significant indicators of infant feeding practice. However general effects of modernisation, industrialisation and development, indicated in the data by state, appeared to be significant. Again depending on residence, the data suggested that the supplementation of breast milk with artificial milk was increasingly common, and that also women increasingly use commercially manufactured as well as home-made weaning foods. The details of infant feeding choice however remain obscure. One of the shortcomings of the study was said to be related to the method of collection of data, and serve to highlight the need for detailed ethnographic studies to better explore the variability and complexity of the patterns of infant feeding.

### **813. NORMA HASHIM**

#### **Food consumption patterns of the Bidayuh in Serian District, Sarawak**

*Laporan Akhir Penyelidikan, Fakulti Pertanian, Universiti Pertanian Malaysia, Serdang, 1984*

The study was carried out on the Bidayuh, one of the natives of Sarawak. The studied population was settled in Serian District, Sarawak. Out of the 23 villages in the district, 7 were chosen for the survey. A total of 128 households were interviewed. Household food consumption patterns and its socio-economic and socio-cultural determinants was studied. Those households with children below 3 years were also interviewed on infant feeding practices. A brief discussion on the food taboos during pregnancy and post-partum were also reported.

### **814. SITI NOR YAACOB**

*Pengetahuan dan amalan terhadap makanan dan pemakanan di kalangan pelajar-pelajar tahun pertama Universiti Pertanian Malaysia (Food and nutrition knowledge and practices among first year students of the University of Agriculture Malaysia)\**

*Project Report submitted to Universiti Pertanian Malaysia in partial fulfillment of the requirements for the Degree of Bachelor of Science (Human Development), 1984*

The objectives of the study included the determination of knowledge and practices of food and nutrition among 100 (equal numbers of male and female) first year students of the University of Agriculture, and to identify factors that affected these knowledge and practices. Information were obtained using a designed questionnaire mailed to the selected respondents. The factors studied included sex, previous experience in Home Science subjects, and type of schools attended.

\*Report in Bahasa Malaysia

## DIETS AND DIETARY REQUIREMENTS

### 815. Y.H. CHONG

#### Energy and protein requirements at national or population level -- their estimation and uses

*Paper submitted to the Ministry of Agriculture for a Joint Report on the Demand and Supply of Food during the 4th Malaysian Plan, 1979; 12 p. (mimeographed)*

In contrast to individual nutrient requirements, per capita requirements at the national or population level is obtained by dividing the total nutrient requirement by the total population with suitable weightings for sex and age. The paper gave an estimate of the per capita energy and protein requirements for the Peninsular Malaysia population of 1975 and 1990. For 1975, the per capita energy requirements worked out to be 2080 calories and protein 48 g. The requirements for 1990 was estimated to be 2168 for calories and protein 52 g. Examples of the uses of these estimates for assessment of the nutritional adequacy of current national food supplies and for projection of food demands in 1990 were given.

### 816. ZAINAL ABIDIN ZULKIFLY

#### *Makanan untuk kesihatan (Foods for health)\**

*Proceedings of the Applied Nutrition Project Seminar/Workshop, 27–29 December 1979, Kuching; pp. 101–106*

The paper gave a brief description of the functions of protein, carbohydrate, fat, mineral salts and vitamins to our body. A table of the recommended daily dietary requirements, adopted from the Food and Nutrition Board of the United States National Research Council, was given. The relatively large requirements of children and pregnant and lactating women for protein was pointed out.

\*Paper in Bahasa Malaysia

### 817. R. MAHATHEVAN

#### Nutrition for workers in developing countries

*Bulletin of the Public Health Society, 14:18–23, 1980*

Workers should be adequately nourished to meet their total health needs, including any special demands of their work and their total living needs. An ideal would be for a worker to receive a sufficiently high wage to enable him to purchase adequate diet for himself and his family. In practice this ideal is seldom achieved. Constraints may be economic, when wages are low, geographical when the place of work is a great distance from the home and transport is inadequate. But the most important impediment is educational, when food habits are hygienically unsound associated with cultural and traditional beliefs. The paper reviewed the dietary requirements of workers. The discussion also dealt with measures to improve the diet of workers. The paper dealt with in some detail the establishment of a canteen at the working site as a possible effective measure.

**818. S.T. CHEN**

**Infant and toddler feeding**

*The family Practitioner*, 6(1):51–53, 1983

Food is required by the child for metabolism, growth and energy. The process of feeding has social and psychological implications as well. The paper described briefly the proper infant and toddler feeding practices. Breast milk is the best food for infants and there is no substitute which is equal to it. The composition of human milk is such that it provides optimal nourishment for growth, including brain growth, with minimal stress upon the immature systems of the young infant. In contrast, serious nutritional consequences can result from bottle-feeding infants with inappropriately prepared feeds. After the age of 6 months, introduce some home-made weaning foods since breast milk alone will not provide sufficient calories for the growth of the infant. By one year of age, slowly introduce some family food and by 2 years of age, the child can share almost all family food.

**819. CHONG YOON HIN**

**Food and nutrition for health and fitness**

*Paper presented at the National Seminar on Kercergasan Seumur Hidup – Ke Arah Meninggikan Hasil Kerja, 23–24 July 1983, Pulau Pinang; 7 p. (mimeographed)*

There is no magic formula or a single source of food that will contribute to health, fitness and longevity. The secret lies in choosing a balanced diet selected from as wide a variety of foods as possible and understanding of basic food groups for the purpose of supply of energy, body-building and for body protection. In addition, there is need to eat moderately and to exercise regularly. The paper gave some guidelines on arriving at a balanced diet. Emphasis was placed on overnutrition and diseases associated with affluence, such as obesity, hypertension, coronary heart disease, cancer, and dental caries. To achieve fitness and health, it was emphasized that one has to “avoid wrath, sloth and gluttony”.

**820. MOHD ISMAIL NOOR\***

**Variations in daily energy expenditure in animals and man**

*Thesis submitted to the University of London for the Degree of Doctor of Philosophy, 1983; 219 p.*

This thesis presented an investigation into the wide variations in food intake of both man and rodents and its effects on their energy expenditure. Evidence was presented that some of the rodents were able to increase their heat production in response to increased food intake, whereas other strains laid down fat, thus revealing both genetic and dietary influences on energy balance. The work was extended to studies in man by developing an open-circuit indirect calorimeter for subjects to spend 24 hours and to perform most of their normal sedentary activities. Although the human studies were less controlled than the animal experiments, it was possible to conduct investigations into the effects of food intake, as well as exercise, obesity and drugs on daily energy expenditure. Mild exercise proved to be the deciding factor in maintaining energy equi-

librium in men, but in women, a compensatory effect was observed. Obese women had a higher sedentary metabolic rate compared to non-obese women, but with mild exercise there was no difference. Large eaters had in general higher metabolic rates than small eaters, but the differences were greater when the subjects were exercising. Mild thermogenic drugs were shown to increase metabolic rate of subjects pre-disposed to obesity and to have little effect on others. It was felt that the results could provide a contribution to the understanding of the importance of thermogenesis in man and its relationship to obesity.

\*Author currently at the Department of Food Science and Nutrition, UKM

#### **821. MOHAMAD NORDIN ABDUL KARIM**

##### **Effects of prolonged post-absorptive state on body weight and body fat**

*Pertanika*, 7(1):7–10, 1984

The effects of prolonged post-absorptive state on body weight and body fat were observed in 20 volunteers (Malay university students) who abstained from food and water for 12 hours. At 0 and the 28th day of the study, weight and height measurements were taken, and body fat was determined by measuring skinfold thickness of the subscapular, triceps, biceps and suprailliac. The energy and protein intake of the subjects were determined from collected duplicate food samples over a period of 7 days. Energy expenditure for two subjects was also determined through a time-motion study where activities, recorded for 7 days, were converted into energy using established cost of energy expenditure. At the end of the experimental period, body weight and fat were found to have decreased. The decrease in body weight was significant for both sexes, where the changes observed in body fat were only significant for the male students. Energy and protein intakes of the volunteers were found to be sufficient compared to recommended daily intakes, suggesting that changes had occurred in the body metabolism.

#### **822. MOHD ISMAIL NOOR and D.S. MILLER**

##### **A simple and inexpensive human respiratometer for the measurement of 24 hour energy expenditure**

(in press)

The paper described the development, calibration and operation of an open-circuit indirect calorimeter for the determination of energy expenditure, in which a human subject could spend at least 24 hours either at rest or active. The most important factors considered in the design and construction of this respirometer were economy and simplicity of operation, to enable reproduction of such an apparatus without difficulty. Moreover, comfortable conditions for the subjects, including freedom of movement, were deemed necessary to ensure subject cooperation. The accuracy of the apparatus developed was within 1.0% as measured by combustion of a butane standard. Good reproducibility was obtained for duplicate runs under similar conditions. The measured basal metabolic rate (BMR) was found to agree with the cal-

culated values. It was felt that such an apparatus could prove to be useful and feasible in the developing countries where little or no information on long term energy expenditure is available, especially amidst recent controversy on metabolic adaptation in communities that apparently manage to maintain weight and good health on very low intakes.

## NUTRITION INTERVENTION PROGRAMMES

### 823. ISABELLE COENEGRACHT

#### Applied Nutrition

*Assignment Report Malaysia 5601, Regional Office for the Western Pacific, World Health Organization, 1973; 89 p.*

The report dealt with the Applied Nutrition Programmes in the pilot area of Mukim Tanjong Duabelas, Kuala Langat District of Selangor State, the project expansion to Trengganu State, and the implementation of nutrition activities related to the health component of the project in other locations. General characteristics of the areas, findings of the baseline surveys, and the implementation of the projects were reported. The project objectives with respect to nutrition and health activities in the pilot area were said to have been completed. As an entity however, the project has yet to achieve its stated objectives, such as those planned for the education and agriculture sectors. Nevertheless, ANP was said to have achieved important results as at the higher levels of the ministries, it has created awareness of the nutrition problems in the country and of the need to take concerted action. The need for more nutrition staff and training resources was emphasized, if the objectives of expanding ANP activities to all the states were to be achieved as soon as possible.

### 824. NORAILY AZIZ and M. SUBBIAH

#### Implications of an integrated approach

*Report of the Workshop on Integrated Approach at Grassroots Level Towards Family Planning and Health Programme with Particular Emphasis on Nutrition and Parasite Control, 23–25 March 1977, Kuala Lumpur; pp. 33–36*

In most of the countries, family planning programmes have been implemented as part of health programmes, especially with post partum and maternal and child health services. This "health theme" approach has been well accepted and in the early stages of the programme, there was a steady increase in the demand for family planning services. In the past few years, however there appears to be a plateauing effect of most of the programmes, indicating that generation of demand for family planning through this approach has reached a saturation point. There is thus a need for further identifying other measures which can be used as a vehicle to step up the demands for these services. One of the most popularly suggested is the integration of family planning services in other related fields of health such as nutrition programmes. The paper examined the conceptual framework of the integrated approach as a system, implications and operational difficulties in its implementation.

## 825. RAJ KARIM

### Parasite control, nutrition and family planning in relation to each other and in the total health context

*Report of the Workshop on Integrated Approach at Grassroots Level Towards Family Planning and Health Programme with Particular Emphasis on Nutrition and Parasite Control, 23–25 March, 1977, Kuala Lumpur; pp. 20–23*

Despite the decreasing mortality trends of mothers and children in recent years, the magnitude and extent of the problems in the world are well known and reflected in the continually high levels of perinatal, childhood and maternal mortality. In the first year of life in most of the developing areas the infant mortality rates are 10 to 20 times higher than those of the affluent areas, and in the age group one to four, as much as 30 to 40 times higher. The perinatal period occupies less than 0.5% of the average life span, yet in a number of developed countries there are more deaths within this period than during the next 30 years of life. On a worldwide basis, the major health problems of mothers and children and high rates of mortality and morbidity are related to a triad of interdependent health conditions : malnutrition, infection and the consequences of unregulated fertility. Naturally, these health problems do not exist in isolation and are actually associated with poor socio-economic conditions and scarcity of health and other social services. The paper reviewed these problems and interactions, and emphasized that any efforts in improving the health of the mother, child, family and community must include programmes aimed at tackling these problems in an integrated manner.

## 826. RAJ KARIM and NOR LAILY AZIZ

*Panduan ceramah kesihatan ibu dan kanak-kanak dan perancang keluarga untuk pegawai dan kakitangan kesihatan (A lecture guide on maternal and child health and family planning for health officers and staff)\**

*Yunit Kesihatan Ibu dan Kanak-kanak, Kementerian Kesihatan Malaysia, 1977, 72 p.*

This guide was prepared to assist the health officers and staff members in their preparation for lectures and talks so that there is a standardisation of advices and teachings in their teaching materials. The chapter on nutrition covered aspects on infant feeding, breast-feeding and maternal nutrition. It was emphasized in the guide that nutrition education would best be carried out with the aid of prepared foods and cooking demonstrations.

\*Publication in Bahasa Malaysia

## 827. RAJ KARIM

### The Applied Food and Nutrition Programme as a community health programme

*Proceedings of the Intercountry Workshop on Primary Health Care Development in Malaysia and Republic of Korea (Malaysian Component), 13–18 November 1978, Kuala Lumpur; pp. 41–53*

The high rates of mortality and morbidity prevailing in developing countries have resulted from various interrelated conditions: malnutrition, infection, and the consequences of ill-timed, closely spaced, and too frequent pregnancies, and the lack of health care and other social services, against a background of generally poor social and economic conditions. In Malaysia, the nutritional problems are not as great as when compared to many other developing countries, but the detrimental effects of malnutrition in children on their physical and mental development, their learning capacity at school and eventually on their contribution to national development efforts in later life merits special attention. Although since Independence various extension services of various Government agencies have been providing services to the people, these by and large had not been coordinated at ground level. Finally an integrated approach through a four-pronged strategy was initiated in 1971 for an Applied Nutrition Pilot Project to be carried out at Kuala Langat District of Selangor, in an area called Mukim Tanjong Duabelas, comprising of approximately 10,000 people. Emphasis was given to collaboration of efforts of the various government agencies, and collaboration between government agencies and the people through various community groups, including Village Development Committees, youth clubs, women's groups and farmer's organization. The paper discussed the ANP activities at community level, the results of an assessment carried out in 1973, and extension of the ANP to Trengganu in late 1974. Plans for the expansion of the ANP to all 46 districts where toddler mortality in 1974 was higher than the national average, as well as the states of Sabah and Sarawak in the Third Malaysian Plan (1976–1980) were outlined.

## 828. ABDUL RAHMAN HAJI KASBON

### Effects and implications of the Applied Nutrition Programme on primary pupils in Sarawak – an observation

*Proceedings of Applied Nutrition Project Seminar/Workshop, 27–29 December 1979, Kuching, Sarawak; pp. 119–129*

The paper attempted to highlight some of the effects the ANP had on the primary schoolers in Tebakang, Sarawak and the organizational strategies to be adopted for improved implementation of the programme. It was emphasized that the sustenance of socio-economic status would be enhanced through overall educational improvement and attainment of the community. Correcting nutritional inadequacy at an early stage from infancy to primary school level, as intended in the ANP, was said to be the “only reasonable approach towards the ultimate upliftment of the society at large”. The various activities of the agricultural project of ANP and the supplementary feeding scheme of the 6 primary schools in the area were discussed. Suggestions were

made to further improve these programmes. Analysis of the pupils in these schools revealed that (a) there was a visible improvement of their general health; (b) their annual average attendance seemed consistent, and (c) there was a general improvement in their attainment in the Standard 5 assessment examination. The importance of the school feeding scheme, the agricultural projects and supportive health monitoring in achieving the objectives of the ANP was emphasized.

#### **829. ANDREW SALIP RIDU**

##### **ANP pilot project in Tebakang – the District Co-ordinator's viewpoints**

*Proceedings of Applied Nutrition Project Seminar/Workshop, 27–29 December 1979, Kuching, Sarawak; pp. 77–80*

Chronic and extensive food shortage was said to be present all over rural Sarawak (inland as well as coastal). Hence there was an **urgent need** for Applied Nutrition Projects to be implemented in the State. An ANP pilot project was started in Tebakang in 1975. The author reviewed briefly the progress of the Project. It was said that the principal objectives of the ANP was not being achieved. "The tide of malnutrition and semi-starvation" had not been checked, least of all improved. Various reasons and factors for the failure of the Project were discussed. It was suggested that a proper organisation be set up to ensure proper running of the Project.

#### **830. ISHAK CHE LONG**

##### **The role of ANP in socio-economic development**

*Proceedings of Applied Nutrition Project Seminar/Workshop, 27–29 December 1979, Kuching, Sarawak; pp. 40–58*

Some mortality data and results of nutrition surveys were presented to show that a mild to moderate form of malnutrition was present in the country, especially amongst the lower income group of the rural areas. In the past, several government agencies had been carrying out various uncoordinated activities at local level, directly or indirectly involving food and nutritional problems. Although these activities did contribute to some extent to the improvement of the nutritional status, it was felt that concerted and coordinated efforts would have been more effective. An integrated approach through a four-prong strategy was formulated and the Applied Food and Nutrition Programme was launched as a pilot project in Kuala Langat in 1969. The paper discussed the AFNP in some detail, touching on the objectives, strategies, activities of the various departments involved, and the different phases of planning and implementation of the Programme. Allocations and expenditures, training sessions and evaluations of the AFNP were also discussed. Under the Third Malaysia Plan, 46 districts in Peninsular Malaysia were selected as AFNP districts. Results of the evaluation of three of these districts were briefly reported. It was emphasized that ultimately, the nation should have a long-term master plan with definite strategies on food production and nutrition development. Some of the key elements of the master plan were proposed.



### 831. GLORIA LEONG

The Pilot ANP project, Tebakang, Serian – in retrospect

*Proceedings of Applied Nutrition Project Seminar/Workshop, 27–29 December 1979, Kuching, Sarawak; pp; 69–76*

The achievements, problems and shortfalls faced by the ANP in the Tebakang area were briefly discussed. Among the achievements mentioned were that the ANP had created general awareness of the malnutrition problem, and that the villagers had been motivated to participate in various ANP projects. The majority of the villagers felt that they had benefited much from the ANP and they considered it a good project as it provided Government aids besides maintaining environmental sanitation and cleanliness. Monitoring and evaluation of the various activities had not been satisfactory. There appeared to be no increase in both subsistence and cash crop production, poultry ownership, fish pond ownership and pig rearing in the area. It was also said that there was no improvement in the socio-economic status of the people. The nutritional status of the pre-school and school children had not shown improvement. Various recommendations or lines of action for the planning, implementation and monitoring of ANP projects in the existing and new areas in Sarawak were proposed and elaborated.

### 832. MEDICAL DEPARTMENT SARAWAK

Joint inter-department paper by Medical Department as a supplement to MCDS evaluation report and addition to the ANP working paper by the Medical Department

*Proceedings of Applied Nutrition Project Seminar/Workshop, 27–29 December 1979, Kuching, Sarawak; pp. 145–165*

The medical and health facilities and services of the pilot Applied Nutrition Project area of Tebakang sub-district, launched in 1976 was briefly described. A main part of the paper dealt with comparative findings on environmental sanitation, utilization of maternal and child health services and nutrition education between the baseline survey of 1975 and the evaluation findings of 1978, carried out jointly with the Malaysian Centre for Development Studies (MCDS). Comparative sanitation survey results were presented and showed an overall increase of 23.37% in the coverage of all the health projects for the latter survey. Maternal care facilities were compared; more of the respondents were found to be utilizing trained midwives either at home, at the hospital, M.C.H. clinic or private maternity homes for delivery in 1978. An increased coverage of the children for all types of immunisation and increased utilization of family planning been maintained and there was a greater utilization of powdered milk as a complement to breast milk. Two "nutritional programmes" started in 1978 in the area were next discussed. The Nutritional Rehabilitation Centre admitted underweight children under 7 years with their mothers on a stay-in basis with the main objective to rehabilitate the children and to train the mothers in proper methods of feeding and child care through their active participation in the programme. The second programme discussed was the Village Feeding Schemes. No details were given of the so-called village a-meal-a-day feeding schemes, although these were said to be have operated commendably.

The second paper focused attention on the “nutritional programmes” mentioned above. Problems faced with participation at the Nutritional Rehabilitation Centre, the Batu Kerun village feeding scheme and the follow-up of participants were briefly discussed.

### 833. PRIME MINISTER'S DEPARTMENT, MALAYSIA

*Kajian imepek Rancangan AMP: Laporan induk (Impact study of the ANP)\**

*Pusat Pengajian Pembangunan Malaysia, Jabatan Perdana Menteri, Kuala Lumpur, 1979; 91 p.*

The Pilot ANP was launched in Kuala Langat in 1969. An evaluation carried out in 1973 had shown that the pilot project was successful. Based on this, the Government had extended the ANP to other areas of the country. By 1976, the ANP had covered 12 districts, 21 more in 1977, and an additional 11 districts by 1978. In view of the fact that the ANP was to be extended to other areas throughout the country, it was thought necessary to carry out another impact evaluation study so as to identify the problems encountered during the implementation as well as the results obtained. Details of the methodology used in the study were given in the report. The effects of the ANP were evaluated from several aspects, including changes in income levels, health and sanitation practices, dietary patterns, educational levels, and changes in attitude. Various recommendations were made for improving the organization and implementation of the ANP.

\*Report in Bahasa Malaysia

### 834. PRIME MINISTER'S DEPARTMENT MALAYSIA

**Food and nutrition policies of Malaysia**

*Country paper presented at the ASEAN Consultative Meeting on Food and Nutrition Policies, 10–12 December 1979, Manila; 68 p.*

In the introductory chapter on the ‘quality of life’ in the country, a brief description was given of the income distribution, the situation of the labour force, and the agricultural, institutional and price developments. The chapter on the current status of food production and nutritional policies were next reviewed. Topics covered in the chapter included the supply-demand situation for various essential foodstuffs; various immediate food production action programmes including that for crop, livestock and fish production intensification; the constraint affecting the implementation of these programmes; and the major policy issues in the context of food production and nutrition development namely crop, livestock and fisheries subsidies, output pricing, credit provisions, employment creation and consumer prices. The strategy and organization of the Applied Food and Nutrition Programme and the implementation, evaluation and expansion of the Programme was discussed in some detail in a separate chapter.

### 835. SITI ZAHARAH HUSAINI

#### Planning an ANP in Sarawak conditions

*Proceedings of Applied Nutrition Project Seminar/Workshop, 27–29 December 1979, Kuching, Sarawak; pp. 59–68*

Recommendations on how a systematic planning approach could be applied to improve and plan future ANP or other nutrition programmes were made. Project planning, viewed as a continuous process, could start from Research to Specific Programme Planning, to Implementation, to Monitoring to Evaluation and back to Research. Research, carried out by institutions permanently and consistently geared to carry out the necessary research input, should be realistic and geared to the capability of the agencies undertaking the implementation. In Specific Programme Planning, the actual problem areas have to be pin-pointed and the long-term as well as short-term solutions to the problems. A regular watch over the progress of the project is of vital importance. At the end of the planned period, an Evaluation to assess the project as a whole should be carried out. It was however emphasized that more commitments of all concerned, especially the political will to make nutrition programmes as part and parcel if not the core of the development of the nation, is of paramount importance.

### 836. WAN HILAL WAN ABDUL RAHMAN

#### Experience of Kuala Langat ANP

*Proceedings of Applied Nutrition Project Seminar/Workshop, 27–29 December 1979, Kuching, Sarawak; pp. 107–118*

The pilot ANP in Kuala Langat was launched in 1969 in Mukim Tanjung XII, with a population of 10,000. Prior to that, a baseline survey was carried out in 1969; the results were briefly reported. An integrated approach to implement the Project through a four-pronged strategy was taken: a. improved economy and food production; b. educational activities including nutrition, education, home economy, community education, school health activities and pre-school activities; c. health and sanitation activities including nutrition surveillance, treatment and rehabilitation; and d. supplementary feeding at clinics, preschool child care centres and schools. The administrative set-up of the ANP Committee was briefly described. Emphasis was given to the need for the community to develop a positive attitude towards change and to be self-reliant. Various departmental workers gave talks and demonstration to groups at village level. Home visits were made by home economists, agricultural extension workers, health and voluntary workers. The various health and school activities and the role of the Department of Community Development (KEMAS) were described. The various achievements of the ANP were highlighted. Data were presented to show a fall in toddler mortality rate, an increase in the number of pour-flush toilets being built, improvement in the attendance of expectant mothers to the clinic, and attendance in schools. The Project had demonstrated an integrated approach among Government Departments, voluntary bodies, Village Development and Security Committee and the community. Valuable experience was gained in methods of getting community participation at grassroot level. There was a greater awareness of the need to improve family health and nutrition. The ANP had been accepted not only as a health project but also as Community Development Project. Although problems areas existed, it was emphasized that these were overshadowed by the general success of the Project.

**837. ROGER WEE and NGUI LIAN JIN**

**A review of the agricultural and home economics extension service in pilot ANP, Tebakang, Serian**

*Proceedings of Applied Nutrition Project Seminar/Workshop, 27–29 December 1979, Kuching, Sarawak; pp. 130–145*

As an integral part of the whole ANP in the Tebakang area, the Department of Agriculture implemented various Agricultural projects and Home Economics Extension programmes. Participants in all the 16 ANP kampungs, the 6 primary and 1 secondary schools in the area were encouraged to set up vegetable gardens to produce foods for home consumption. Vegetable seeds, fruit tree seedlings, fertilizers and pesticides were provided free, together with technical advice and guidance. With regards to the poultry rearing projects, outcome of the 4 broiler projects implemented were reported to be variable and generally discouraging. The layer projects too were reported to be unsuccessful. On the other hand, freshwater fish culture in ponds was said to have become very popular in the area with the construction of new ponds as well as the restocking and recondition of old ponds. Fish population in the rivers of the area were also built up. Home Demonstrators of the Agricultural Department (who also carried out the vegetable and fruit growing projects) conducted various Home economics Extension Service programmes in the kampungs to emphasize to the participants the importance of knowledge of food values and nutritional deficiencies. Methods of food preservation when seasonal foods were in plentiful were also taught. The teaching of these rural women on how to make simple garments for themselves and for their families was also carried out. Advice on home management were continually imparted to the participants. Special emphasis was placed on environmental sanitation and home kitchen improvement, including proper food storage facilities. The home management programme, however, turned out to be the least successful among the many projects carried out; reasons for the unsatisfactory results were briefly discussed. From the review, several problems and constraints which needed to be remedied were identified. Suggestions and recommendations were made for further successful implementation of the ANP.

**838. AHMAD MUSTAFFA HAJI BABJEE**

***Kemajuan perusahaan susu ke arah memperbaiki kesihatan kanak-kanak sekolah (Dairy development towards improving health of school children)\****

*Proceedings of the Seminar on Supplementary Feeding Programme in Malaysia, 16–17 January 1980, Kuala Lumpur; pp. 43–47*

Milk, whether of human or animal origin has been recognized as the most complete single food item available to man. It is the perfect food for supplementary feeding programmes especially in developing countries where protein calorie deficiency has been identified as a major nutritional problem. The paper discussed the long term development of dairy industry in Malaysia in order to make more milk available to school children through these feeding programmes. In 1978 only 5% or less of the national dairy requirement was produced locally. Plans of the Department of Veterinary Services (DVS) Dairy Development Programmes to increase milk production

to meet 20% of the national demand by 1990 were discussed. Figures were presented to show the increasing contributions made by DVS in the supplementary feeding programmes of school children. It was emphasized that the DVS will attempt to play a greater role in these feeding programmes in the years to come.

\*In both English and Bahasa Malaysia

#### 839. KHOR, G.L.

##### The role of a co-ordinated food and nutrition policy in developing countries

*Proceedings of the International Symposium on Food Technology in Developing Countries, 3–5 September 1980, Kuala Lumpur*; edited by S.K. Berry, Mohd. Ismail Abd. Karim and Aisah Mohd. Zain; pp. 389–401

Malnutrition constitutes a part of the large problem of 'deprivation syndrom' which is characterised by poverty, lack of education, substandard living conditions, inadequate food, malnutrition and disease. In order to break this circle of deficiencies, multisectorial programmes which include socio-economic development, education, increased production and equitable distribution of food, and improvement in individual and environmental health are imperative. As these various programmes encroach into the responsibilities of a number of public and to a lesser extent, private agencies, the formation of a co-ordinated food and nutrition policy is a logical step. Such a policy is particularly desirable in developing countries especially in this era of generalized inflation resulting in price increases of basic goods and services. Governments tend to view food and nutrition problems as periheral emergencies which can be solved by short-term measures such as supplementary feeding. These measures have often been undertaken by a sector only without overall integration. A better solution calls for multi-sectorial planning as a tool for intermediate and long-term efforts, especially in view of the fact that alterations in areas like agricultural production, education and environmental sanitation are not amenable to short-term change. The paper presented three models for the planning of food and nutrition policies and programmes namely, the systematic analysis approach, the nutrition-based development approach and the community nutrition approach. The need for a systematic analysis of the whole food and nutrition problem, effective coordination, involvement at the grass-root level and continuous surveillance was emphasized.

#### 840. MAMAT SALLEH

*Peranan Majuternak di bidang perusahaan tenusu dalam meninggikan taraf kesihatan kanak-kanak* (The role of Majuternak's dairy development towards improving child health)\*

*Proceedings of the Seminar on Supplementary Feeding Programme in Malaysia, 16–17 January 1980, Kuala Lumpur*; pp. 49–57

Efforts in improving the nutritional and health status of the younger generation are investments on the human resources development which will contribute to the improvement of quality of life at present and upgrade the quality of manpower in the

future. With this in mind, various pre-school and school supplementary feeding programmes had been implemented; these were briefly reviewed in the paper. Most of the children under the various schemes had been provided solid food or hot meals and the provision of milk was done on a rather limited scale. It was suggested that the School Milk Programme be planned with the ultimate objective of full coverage of primary school children to be attained within a specified period of time. An assessment of the proposed Programme, including its financial involvement, the estimated coverage of children, and stages of development was made. The role of the National Livestock Development Authority or Majuternak in the implementation of such a Programme was explored. Such involvement could be considered as Majuternak's indirect yet positive contribution towards improving child health and the development of human resources for the overall national development.

\*In both English and Bahasa Malaysia

#### 841. THOMAS T. OOMMEN

*Makanan tambahan di sekolah (School supplementary feeding)\**

*Proceedings of the Seminar on Supplementary Feeding Programme in Malaysia, 16–17 January 1980, Kuala Lumpur; pp. 35–41*

School supplementary feeding programmes serve not only nutritional purposes but also educational on the various aspects of food and nutrition and could aid in training the young for desirable social behaviour. The history of school feeding programmes in the country was briefly traced from the time immediately after the Second World War to those currently being implemented by the Ministry of Education. The programme in 1980 covered all the districts in the States in Peninsular Malaysia, all the districts in the Residencies of Sabah and all the districts in the Divisions of Sarawak. 6,403 primary schools were covered, benefiting a total of 665,700 pupils at a total cost of M\$19,975,000. "Balanced" snacks, based on various menus making use of local foodstuff were provided to these pupils for 150 days in that year. The needs, benefits and some problems involved in implementing the programmes were highlighted. It was emphasized that the technological, administrative and human behaviour aspects of the programmes should be considered as an interrelated and inter-dependent system.

\*In both English and Bahasa Malaysia

#### 842. ZANARIAH JIMAN

**Food and nutrition planning in Malaysia and possible contribution of the agricultural sector**

*Report No. 224, Agricultural Product Utilisation Division, MARDI, Serdang 1980; 21 p.*

Malnutrition is a problem inter-dependent on multiple factors such as poverty, accessibility to health services, agriculture production, income distribution, etc. This paper

outlined the food and nutrition programmes and various aspects of the relationship between nutrition improvement and the contributions of the agricultural sector. Nutritional deprivation has many adverse effects such as the lowering of resistance to infectious diseases leading to a high rate of mortality among children, affecting mental and physical development and productivity and the span of working life. Development in the agricultural sector is one of the keys to economic and social progress for a developing country and has much to offer to combat malnutrition problems.

#### 843. KHAIRUDDIN YUSOF

**“Sang Kecil” – care of urban squatters in Malaysia**

*World Health Forum*, 3(3):278–281, 1982

The number of squatter settlements in Kuala Lumpur has risen dramatically in the last 10 years. The various problems continuously faced by these families include health, population, emotional stress, as well as preschool education and child care. Since children are sensitive indicators of social, economic, and health deprivation, particular attention was devoted to them. It was however recognized that their needs had to be considered in concert with those of the rest of the family, particularly the mother. The paper described the setting up *Sang Kecil*, an intervention programme that focused first on preschool education, then, after the programme had taken firm root in the settlements, on maternal and child care clinics, and finally on income-generating activities.

#### 844. TEE E SIONG

**Implementation of resolutions and recommendations of previous ASEAN Food Habits Workshops: a Malaysian report**

*Report of the 4th ASEAN Food Habits Workshop, 29 November – 4 December 1982, Yogyakarta, Indonesia*; 14 p.

The report summarised the actions taken by the various institutions and agencies in Malaysia in implementing the resolutions and recommendations passes by the three previous ASEAN Food Habits Workshops, grouped as: 1. Surveys on Food Consumption and Habits; 2. Documentation of Studies on Food Habits; 3. Research, Development and Formulation of Inexpensive Nutritious Foods, and 4. Intensification of Nutrition Education. Various institutions such as IMR, MARDI and UM were reported to have been conducting several localized and scattered studies in different parts of the country in attempting to understand the food consumption and habits of the communities, particularly those in the rural poverty areas. An effort had been made to document these and all previous studies in the compilation of an Annotated Bibliography of Nutrition Research in Malaysia by the IMR. At the same time, other institutions such as MARDI, UPM and UM were reported to have been actively involved in research and development of nutritious foods for the communities. Subsequently, various training programmes were initiated to transfer the developed technologies to enable the processing of these nutritious foods at the community level. Various nutritious supplementary foods, making use of locally available and acceptable raw materials were developed. The successful development and subsequent commercial pro-

duction of "Nutrima" snack food for children was mentioned. As a long term intervention programme, various efforts were reported to have been made by the Ministry of Education, Ministry of Health and KEMAS in carrying out nutrition education activities through various channels to the different target groups. Through such diversified but unified efforts of the different institutions and agencies, the ASEAN Protein Project was said to have been able to contribute towards improving the nutritional status of the underserved communities in the country.

**845. WILLIAM P. BUTZ, JEAN-PIERRE HABICHT and JULIE DaVANZO**

**Improving infant nutrition, health and survival. Policy and program implications from the Malaysian family life survey**

*Malaysian Journal of Reproductive Health*, 1(2):127–138, 1983

Infants' nutrition, health, and survival are matters of great concern in Malaysia. This report presented the principal program and policy implications from a survey and research project, the Malaysian Family Life Survey (MFLS) (abstract no. 555), that had investigated these phenomena in Peninsular Malaysia. The paper began by describing post-World War II trends in infant mortality and breastfeeding in the country, since these were the two policy targets of central interest. The findings (from the MFLS) used for analysis in this study, were briefly described and the quality of the data discussed. Findings that were pertinent to health, nutrition and family planning programmes, water and sanitation programmes, as well as for overall socio-economic policy were then discussed. Recommendations were made for future research and for current programme and policy initiatives.

**846. LEKHRAJ RAMPAL**

**Nutrition and tropical diseases: educational aspects in Malaysia**

*Southeast Asian Journal of Tropical Medicine and Public Health*, 14(1):78–81, 1983

This report highlighted some of the educational aspects of nutrition and tropical diseases. Health conditions in most of the countries in this region has improved, but not at the same pace as the progress in medical sciences. The slow progress in tackling this problem has been partly due to the failure of understanding psycho-social, cultural and economic patterns. Many of the health workers and educators who are involved in the control of tropical diseases emphasize on practice rather than research. Due emphasis should be given to training and research in health education involving not only the professionals and auxiliary staff but also political leaders, policy makers and community leaders at grassroot level.

**847. ZAHARIAH JIMAN**

**Supplementary food programmes for children in Malaysia**

*Paper presented at the Workshop on Home and Village Prepared Supplementary Foods in Asia, 28–30 October 1983, Bangkok; 14 p.*

Supplementary feeding programmes are aimed to achieve the end goal of improving the nutritional status of selected groups in as short time as possible. The paper re-



viewed briefly the various programmes for children in the country. This included school supplementary feeding programmes through balanced snacks prepared from prescribed menus using local foodstuffs. Various supplementary foods developed by the Food Technology Division of MARDI especially for preschool children were also described.

#### **848. ZANARIAH JIMAN and MAMOT SAID**

*Kesihatan dan pemakanan sebagai satu mata-pelajaran biologi (Health and nutrition as a subject in biology)\**

*Paper presented at the Seminar on Pendidikan Biologi Kebangsaan, 16–17 March 1983, Kuala Lumpur; 34 p. (mimeographed)*

The teaching of health and nutrition in schools is as important as the other science subjects. The subjects are of direct relevance to the health and nutrition status of the students, as well as that of their family members. Various aspects which are related to food chemistry, physiology, food microbiology, and community health should also be taught in schools. The paper provided some suggestions and guidelines on the teaching of these various subjects. Topics covered included the various nutrients in foods and their functions, the food sources of these nutrients, nutrient requirements, food processing and food safety.

\*Paper in Bahasa Malaysia

## SUBJECT INDEX

- Additives
  - see* Food additives
- Affluence
  - malnutrition problems and 540, 549, 619
- Aflatoxin
  - and liver cancer 759
  - detection and determination of 744
  - health hazard of 744, 753, 754
  - review of 744, 753
- Agriculture
  - contribution to food and nutrition programmes 842
  - pattern in Malaysia 527
  - projects in the ANP 828, 837
- Amino acid
  - changes during cooking
    - of mung bean 672
  - changes during fermentation
    - of soya sauce 700
    - of tempeh 679
  - changes during germination
    - of mung bean 672
    - of winged-bean 696, 713
  - changes during processing
    - of cocoa beans 658
  - composition
    - method of analysis 719, 720
    - of deboned poultry meat 667
    - of fresh water fishes 721
    - of marine fishes 721
    - of mung bean 672
    - of mushroom 626
    - of petai 714, 715
    - of rice-mung bean mixture weaning food 730
    - of rice-soy mixture weaning food 730
    - of sea lettuce 661
    - of single cell protein
      - from tapioca waste 687
      - from pineapple waste 689
    - of soya sauce 700
    - of tempeh 659, 679
    - of tempeh and unfermented soya bean 679
    - of thermotolerant fungi 628
    - of turtle egg 695
    - of winged-bean 696, 713
    - release and fermentation time 700
- Anaemia
  - see* Nutritional anaemia
- Applied Food and Nutrition Programme (AFNP)
  - see* Applied Nutrition Programme
- Applied Nutrition Programme (ANP)
  - planning, implementation, activities, evaluation of 531, 823, 827, 828, 829, 830, 831, 832, 833, 834, 385, 836, 837
  - socio-economic factors associated with adoption of 788
- Armed forces
  - nutritional status of 564
- Artificial sweeteners 742, 764
- Ascorbic acid (vitamin C)
  - effect of germination on 723
  - effect of processing on 674, 727
  - effect of storage on 711, 726, 727
  - effect on iron and zinc utilisation 596
  - in guava 727
  - in fruit juices and concentrates 703, 711, 712, 726
  - in sweet potatoes 674
  - intake of students 590
- Availability
  - of food
    - see* Food availability
  - of health facilities for estate workers 560
  - of iodised salt 610
  - of protein sources 528, 540,
- Available lysine
  - determination in miscellaneous foods 665
- Beans
  - see individual bean*
- Belacan
  - colouring matters in 765
- Benzoic acid

- as food preservative 732
- in soya sauce 651
- Biological evaluation
  - of protein foods *see* NPU, NPR, PER, BV, D
- Biological Value (BV)
  - of food formula 684
  - of mung bean 680
  - of mushroom 626
  - of protein in sorghum 752
  - of winged bean and lentil 761
- Birthweight
  - as a determinant of infant mortality rate 547
  - as an indicator of nutrition status 549, 550, 554, 581
  - maternal nutrition and 582, 597
  - socio-economic correlates of 582
- Borate
  - in fish ball 729
- Breastfeeding
  - as a biological correlate of infant mortality rate 547
  - benefits of 775, 780, 781, 784, 786, 790, 801
  - causes for the decline of 775, 776, 778, 779, 780, 783, 784, 786, 791, 802, 803, 845
  - measures to encourage 774, 780, 791, 826
  - survey of 555, 770, 771, 772, 792, 797, 798, 804, 806, 811, 812
- Cancer
  - and cyclopropenoid fatty acids 740
  - and dietary aflatoxin 744, 759
  - and the diet 759, 819
  - risk factors of 759
- Cekur manis*
  - chemical and nutrient composition of 662
- Cereal (s)
  - for processing into traditional foods 722
  - nutritive value of 691
  - review of 691
  - weaning foods 698
- Chemical Score
  - of winged bean seeds 713
- Children
  - follow-up study of 558
  - nutritional problems/status of 537, 539, 545, 558, 559, 602, 787
  - nutritional requirements of 537
  - nutritional status and mental development of 558
  - pre-school
    - food habits of 800, 805
    - nutritional problems/status of 541, 544, 554, 565, 572, 573, 574, 575, 576
  - supplementary foods for 541, 544, 603, 847
  - school
    - ANP activities for 828
    - expenditure pattern of 808
    - health services for 544
    - lactose intolerance amongst 584
    - nutritional problems/status of 541, 544, 554, 556, 577, 578, 579
    - nutritional requirements of 531
    - supplementary foods for 541, 544, 847
- Cholesterol
  - and coronary heart disease 618, 620, 621
  - content
    - of sea lettuce 661
    - of seafoods 681
    - of eggs 695
- Cockles (*kerang*)
  - cholesterol in 681
  - essential trace elements in 630
- Colouring matters
  - see* Food colours
- Corn
  - see* Maize
- Coronary heart disease
  - lipids in 618, 619, 620, 621, 702, 819
- Cyanide
  - in cooked and uncooked tapioca 730
  - method of determination 730
- Cyclopropenoid fatty acids
  - and cancer 740
  - effect of cooking on
    - in China-chestnut 755
    - in durian aril and seeds 746

- in gñemon and products 747
  - in China-chestnut 748, 755
  - in durian aril 746
  - in durian seeds 622, 746, 748
  - in gñemon seeds and leaves 747, 748
  - in okra seeds and fruits 668
  - in kapok seed oil 739, 748
  - in various seeds and nuts 740, 748
- Dental caries
  - and bottle feeding 617
  - and sugar consumption 616, 619
  - and water fluoridation 615
  - amongst school children 556
- Detoxification
  - of aflatoxins 774
  - of miscellaneous toxicants 741
- Diet
  - and cancer 759
  - and coronary heart disease 618, 619, 702, 819
  - balanced 819
  - in residential schools 717
- Dietary assessment
  - see Nutritional status, dietary assessment of
- Dietary pattern
  - see Nutritional status, dietary assessment of
- Dietary requirements
  - see Nutritional requirements
- Digestibility
  - of lentil 761
  - of winged bean 713, 761
- Durian
  - fatty acid composition of 677
  - nutrient composition of 622
  - seed
    - cyclopropanoid fatty acids in 622, 746, 748
    - fatty acid composition of 746
- Economic
  - aspects of health 535
  - extension services of the ANP 837
- Egg
  - for processing into traditional foods 722
  - turtle and hen, nutrient composition compared 695
- Endemic goitre
  - aetiology of 606, 607, 608, 609, 611, 614
  - as a nutritional problem in Malaysia 553, 834
  - intervention measures for 605, 608, 609, 610, 611, 612, 614
  - review of 609, 611, 614
  - role of tapioca in 607, 608, 613, 614
  - survey of 605, 606, 607, 608, 612
- Energy expenditure
  - determination of 820, 821, 822
- Fast foods
  - nutritive value of 543, 706
- Fatty acid
  - and flavour of cocoa beans 658
  - and organoleptic quality of durian 677
  - changes
    - during frying of oils 710
    - during germination of winged bean 696, 713
    - during maturing of okra fruit 668
    - during processing of cocoa beans 658
    - during storage of fish 675
  - composition
    - and flavour of cocoa beans 658
    - and organoleptic quality of durian 677
    - and kapok oil 739
    - of china-chestnuts 755
    - of durian 677, 746
    - of fresh water fishes 675
    - of fruits 644
    - of frying oils 710
    - of gñemon 747
    - of groundnut oil 688
    - of marine fishes 675
    - of okra fruit 668
    - of petai 714, 715
    - of rambutan seeds 690
    - of sea lettuce 661
    - of seeds and nuts 740
    - of starfruit seed oil 643
    - of winged bean 631, 671, 685, 696, 713
    - winged bean and soya bean oil

- compared 631
  - cyclopropenoid 622, 668, 739, 740, 746, 747, 748, 755.
  - fractionation on TLC 685
- Fermented foods
  - available lysine content of 665
  - nutrient composition of 639, 640, 648, 666, 679
  - review of 639, 640, 648, 655
- Fibre
  - content of legumes, roots and leafy vegetables 705
  - effect on nitrogen, dry matter and energy digestibilities 673
- Fish
  - as cheap sources of animal protein 635
  - based food supplement and snack 623, 692
  - ball (from cheap fishes), nutrient composition of 729
  - cholesterol in 681
  - essential trace elements in 653
  - for processing into traditional foods 722
  - fresh water
    - amino acid composition 721
    - fat content 675
    - fatty acid composition 675
    - for processing into *ikan pekasam* 694
    - nutrient composition 721
  - marine
    - amino acid composition 721
    - fat content 675
    - fatty acid composition 675
    - nutrient composition 721
  - mercury in 751
  - pesticide residue in 733
  - salted
    - and nitrate and nitrite content 768
    - consumption and nasopharyngeal carcinoma 757, 758, 759
- Fluoridation
  - in the prevention of dental decay 615
- Folate
  - content of foods 707, 708, 709
  - in nutritional anaemia 597, 598
- Food additives
  - review of 732, 742
  - in meat products 767, 768
- Food and Nutrition Policy 834, 839
- Food availability
  - and malnutrition problems 540, 549, 554, 580, 834
  - as indicator of nutritional status 549
- Food beliefs and practices
  - in the causation of malnutrition 531
  - studies of 552, 557, 561, 562, 663, 567, 568, 569, 570, 571, 574, 773, 785, 792, 794, 797, 805, 807, 809
- Food colours
  - as food additives 742, 764
  - food legislation and 764, 766
  - in *belacan* 765
  - in chili sauce 765
  - in hamburgers 767
  - in orange juice 712, 765
  - method of determination for 765
  - review of 766
- Food composition table 682, 697
- Food consumption
  - data on 527, 586, 834
  - determinants of 589
  - studies of *see* Nutritional status, dietary assessment of
- Food contaminants and extraneous matters 733, 735, 742
- Food habits
  - see* Food beliefs and practices
- Food legislation
  - for additives and preservatives 764, 766
  - for food contaminants 735
  - for meat products 728, 731
- Food preservatives
  - legislations for 764
  - review of 732, 742
- Food supplements
  - development of 623, 625, 663, 684, 692, 844, 847
  - also see* Supplementary feeding programmes
- Food Taboos

- see Food beliefs and practices
- Four-angled bean
  - see winged bean
- Fruit juices and concentrates
  - ascorbic acid in 703, 711, 712, 726,
  - chemical and nutrient composition of 703
  - colouring matters in 765
- Fruits
  - fatty acid composition of 644
  - for processing into traditional foods 722
  - nutrient composition of 633, 690, 699, 718
  - nitrate and nitrite in (pickled) 768
  - utilisation of 633, 699
- Fungi
  - nutritive value of 628
  - safety evaluation of 737
- Germination
  - changes in nutritive value during 656, 657, 672, 680, 696, 701, 713, 723
- Gnemon
  - cyclopropanoid fatty acids in 747, 748
  - keropok* from seeds of 747
- Goitre
  - see Endemic goitre
- Goitrogens
  - in the aetiology of endemic goitre 607, 608, 609, 611, 613, 614
- Groundnut
  - oil, fatty acid composition of 688
- Guavas
  - vitamin C in 727
- Haemagglutinins
  - in legumes 734, 741
  - in lentils 761
  - in mung bean 672
  - in petai 714, 762
  - in winged bean 761
- Helminth infestations
  - survey of 550, 554, 563, 568, 569, 571, 573, 574, 576
- Hyperlipidaemia
  - as a malnutrition problem 540, 618, 620, 621
- Ikan pekasam*
  - chemical and nutrient composition of 694
- Indicators
  - for food, nutrition and nutritionally related health situation 549
  - of food availability: anthropometric measurements 580
  - of growth: anthropometric measurements 602
  - of socio-economic development : birth weight 581
- Infant feeding practices
  - review of 530, 802, 803, 818
  - study of 530, 531, 533, 560, 770, 771, 772, 797, 798, 802, 805, 811, 812, 813
- Infant mortality rate
  - determinants of 547,
  - trends of 539, 845
- Infection
  - and nutrition, relationship between 529, 601, 604
  - breast feeding and resistance to 781
- Intermediate moisture foods
  - review of 670
- Iodine
  - deficiency in the aetiology of endemic goitre 606, 607, 608, 609, 611, 614
- Iron
  - and zinc utilisation, effect of Ca/P/ascorbic acid 596
  - deficiency anaemia see Nutritional anaemia
  - intake of students 590
  - levels in serum 595, 597, 598
  - requirements for 598
  - stores in pregnancy 594
- Kapok seed oil
  - physico-chemical characteristics of 739
  - cyclopropanoid fatty acids in 739, 748
- Lactose
  - intolerance amongst school children 584
- Lead

- as food contaminant 735
- in breast milk 760
- in meat products 725
- in vegetables 743
- review of 749, 769
- Lectins
  - in legumes 734, 741
- Legumes
  - antinutritional factors in 741
  - fibre content of 705
  - for processing into traditional foods 722
  - lectins in 734
  - nutritive value of 627, 691
  - review of 691
- Lentils
  - antinutritional factors in 761
- Lysine
  - in maize 736
  - in miscellaneous foods 665
  - also see* Available lysine
- Maize (corn)
  - protein in 736
  - antiproteinase activities in 736
  - nutritive value of 657
- Maternal and child care services
  - of squatter settlements 843
  - utilisation of 832
- Maternal nutrition
  - as a correlate of birth weight 582
  - education in 826
  - food beliefs affecting 531
- Meat products
  - amino acid composition of 667
  - available lysine content of 665
  - food additives in 728, 767
  - food legislation and 728, 731
  - metals in 725
  - nitrite in 728, 763, 768
  - nutrient composition of 667, 725, 728, 767
  - protein quality of 667
  - soya protein in 728, 731, 767
- Mental development
  - nutritional status and 536, 558, 601
- Mercury
  - as food contaminants 735
  - determination in fish 751
  - health hazard of 751
- Microbial protein 628, 737
  - also see* Single-cell protein
- Milk
  - breast
    - benefits/advantages of *see* Breast feeding
    - lead content of 760
    - natural immunisation of 781
    - for supplementary feeding programmes 838, 840
    - fresh, chemical and nutrient composition of 669
    - intolerance amongst school children 584
    - powder, advertising and promotion of 775, 776, 779, 783, 784, 786
    - soya bean, nutritive value of 648
- Minerals
  - in durian 622
  - in fruits 699
  - in mushroom 626
  - in new variety of soya bean 723
  - in petai 762
- Mortality rates
  - see* Infant mortality rates *and* Toddler mortality rates
- Mung bean
  - in the formulation of weaning food 730
  - nutrient composition of 672, 701, 723
  - nutritional changes
    - during cooking of 656, 672
    - during germination of 656, 672, 680, 701, 723
- Mushroom
  - nutrient composition of 626, 634
  - quality of protein in 626, 634
- Mycotoxins
  - as food contaminants 735
  - in legumes 741
  - review of 753
- Nangka*
  - seed, utilisation of 646
- Nasopharyngeal carcinoma
  - nitrosamine and salted fish consumption 757, 758, 759

- risk factors of 757
- Net Protein Ratio (NPR)
  - of mung bean 672
  - of thermotolerant fungi grown on tapioca 628
- Net Protein Utilisation (NPU)
  - effect of tannin on 752, 761
  - of fish-based and soy-based snacks 692
  - of protein-rich foods 642
  - of rice-soy snacks 716
  - of winged bean seeds 713
- Nitrate and nitrite
  - as food additives 732
  - in meat products 728, 763, 768
  - in petai 714, 715
  - in pickled fruits 768
  - in salted fish 768
  - in vegetables 756, 768
  - method of determination 756, 768
- Nitrosamine
  - salted fish consumption and nasopharyngeal carcinoma 757, 758, 759
  - formation from nitrate and nitrite 768
- Noodles
  - available lysine in 665
  - nutritive value of 664, 676
- Nutrient analysis
  - review of 678, 682, 683, 724
- Nutrient composition
  - changes during cooking 649, 672, 676, 704
  - changes during food processing 649, 660, 686, 706
  - changes during germination 672, 696, 701, 713, 723
  - changes during storage 649, 730
  - of *cekur manis* 662
  - of cockles 630
  - of deboned poultry meat 667
  - of diets in residential schools 717
  - of durian 622
  - of fast-foods 706
  - of fermented foods 666
  - of fish ball from cheap fishes 729
  - of fishes, marine and fresh-water 721
  - of food supplements 623, 716
  - of fruit juices and concentrates 703
  - of fruits 690
  - of infant/young children food formula 663
  - of meat products 725, 728
  - of mung bean 672, 701, 723
  - of noodles and pasta products 676
  - of petai 714, 715
  - of ready-to-eat foods 693
  - of soya bean 701, 723
  - of tempeh 679
  - of traditional foods 722
  - of turtle eggs 695
  - of vegetables 686
  - of weaning foods 698, 730
  - of winged bean 696, 701, 704, 713
- Nutrition surveys
  - see Nutrition status, assessment of
- Nutritional anaemia
  - in communities 541, 544, 546, 549, 550, 553, 554, 834
  - in infancy 530
  - in pregnancy 597
  - review of 598
- Nutritional requirements 816
  - during pregnancy/lactation 532, 537
  - of children 531, 537
  - of workers 817
- Nutritional status
  - assessment of
    - anthropometric 533, 546, 557, 559, 561, 562, 563, 564, 565, 566, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 602, 603, 604, 607, 608
    - biochemical 533, 546, 557, 561, 562, 563, 564, 565, 568, 569, 570, 571, 572, 573, 574, 575, 576, 583, 604
    - Clinical 533, 546, 557, 559, 562, 563, 568, 569, 570, 571, 573, 576
    - dietary 538, 557, 560, 561, 562, 563, 564, 565, 568, 569, 570, 571, 572, 573, 574, 575, 576, 585, 587, 588, 590, 591, 592, 593, 603, 605, 607, 608, 773, 799, 805, 810, 813, 844
    - of communities 549, 550, 551, 538,



- 546, 548, 549, 551, 553, 554, 557, 560, 561, 562, 563, 567, 568, 569, 570, 571, 580
- of children 537, 558, 602
- of industrial workers 583
- of pre-school children 565, 572, 573, 574, 575, 576,
- of school children 556, 559, 566, 577, 578, 579,
- of soldiers 564
- Nuts
  - fatty acid and cyclopropanoids in 740, 748, 755
- Obesity
  - as a malnutrition problem 540, 619, 621
- Oil
  - changes during frying of 710
  - chemical and nutritional composition of
    - gnemon seed 747
    - groundnut 688
    - kapok seed 739
    - rambutan seed 690
    - starfruit seed 643
    - winged bean seed 631, 671
  - palm, nutritional improvement of 702
- Okra
  - fruit, fatty acid composition of 668
- Overnutrition
  - as a malnutrition problem 533, 619
  - also see* Obesity
- Pasta products
  - nutritive value of 664, 665, 676
- Pesticide
  - as food contaminants 735, 742
  - residue in food 733
  - effects on fish, bird, man 733
- Petai
  - antinutritional (and toxicants in) 714, 715, 762
  - nutrient composition of 714, 715
- Phytates
  - in petai 762, 714
- Poisoning
  - due to consumption of tapioca 738
  - review of 742
- Poverty
  - and malnutrition 534, 787
  - also see* Socio-economic determinants of nutritional status
- Pregnancy
  - anaemia during 594, 595, 597
  - dietary practices during 782, 785, 794, 805, 807, 809, 813
  - iron stores in 594
  - nutritional requirements during 532, 537
  - nutritional status during 532, 537, 541, 554
- Preservatives
  - see* Food preservatives
- Processing
  - of foods and nutritional changes 649, 658, 660, 674, 686, 691, 706, 722, 727
  - of *ikan pekasam* 694
  - of leaf protein concentrate 564
  - of local fruits 633, 699
  - of single cell protein 687
  - of soya sauce 636, 637, 645, 648, 700
  - of traditional foods 722
- Protein
  - availability, problem of 527, 528, 540
  - cockles as a source of 630
  - content of rice, factors affecting 624
  - effect of tannin on utilisation of 752, 761
  - foods, consumer attitude and acceptance of 789
  - leaf 654
  - microbial *see* SCP
  - of canned foods 652
  - of fungi 628
  - of mushrooms 626, 634
  - sea foods as sources of 635
  - sea lettuce as a source of 661
  - turtle egg, electrophoresis of 695
  - winged bean as a source of 671, 745
- Protein-calorie malnutrition (PCM)
  - as a nutritional problem 533, 540, 541, 546, 549, 550, 553, 554, 601, 602, 603, 604, 834

- Protein Efficiency Ratio (PER)  
 and C-PER of deboned poultry meat 667  
 changes during germination  
 of mung bean 672  
 of winged bean 713  
 effect of dietary fibre on 673  
 of food formula for infants/children 663  
 of protein-rich foods 642  
 of thermotolerant fungi grown on tapioca 628
- Protein-rich foods  
 development of 638, 684, 716  
 metabolic evaluation of 642  
 review of 632
- Reviews  
 cereals and legumes 691  
 diet and coronary heart disease 618  
 endemic goitre 609, 611, 614  
 fermented foods 639, 640, 648, 655  
 fluoridation and dental health 615  
 foetal growth and development 535  
 food contaminants and extraneous matters 733, 735, 742  
 food colours 766  
 food preservatives and additives 732, 742  
 food problems in Malaysia 527, 528, 540  
 food processing and nutritive value 649, 660  
 health care system 535, 548, 551  
 infant feeding practices 530, 802, 803, 818  
 intermediate moisture foods 670  
 lead 749, 769  
 leaf protein concentrate 654  
 malnutrition and mental development 536  
 mycotoxins 744, 753, 754  
 nutrient analysis of foods 678, 682, 683, 724  
 nutrition and infection 529  
 nutrition during pregnancy and lactation 532, 535  
 nutritional anaemia 530, 598  
 nutritional requirements of children 537  
 nutritional status/problems of children 531, 533, 537, 539, 541, 545, 554, 601, 602  
 nutritional status/problems of communities 538, 540, 541, 546, 548, 549, 550, 551, 553, 554,  
 nutritive value of local fruits 633, 699  
 nutritive value of local vegetables 686  
 protein-rich foods 632, 638  
 single-cell protein 650  
 soya bean foods 645, 648  
 soya sauce manufacture, types and quality 636, 637  
 supplementary feeding programmes 840, 841, 847  
 sugar and overnutrition 619  
 traditional foods 722  
 weaning foods 698
- Rice  
 complementation with legumes 680, 730  
 in the formulation of  
 food supplements 632, 716  
 weaning food 730  
 protein content of 624
- Salt  
 iodization and endemic goitre 605  
 609, 610, 611, 612, 614
- Sea lettuce  
 chemical and nutrient composition of 661
- Seafoods  
 cholesterol content of 681  
 essential trace elements of 653  
 protein content of 635
- Seeds  
 chemical and nutrient composition of  
 durian 622, 746, 748  
 gnetum 747, 748  
 kapok 739, 748  
 nangka 646  
 okra 668  
 rambutan 690

- starfruit 643
- winged bean 671, 685, 713, 750
- toxicity of 622, 668, 739, 740, 746, 747, 748, 750
- Single-cell protein (SCP)
  - for food and feed 647, 650
  - nutrient composition of 687, 689
- Socio-economic
  - correlates of birth spacing, family size and breast feeding practices 555
  - correlates of birth weight 582
  - determinants of food consumption 587, 588, 589, 591, 810, 813
  - determinants of infant mortality 547, 845
  - determinants of nutritional status 546, 557, 559, 561, 562, 563, 566, 567, 568, 569, 570, 571, 573, 576, 579, 604, 825
  - development and birthweight trend 581
  - development, the role of ANP in 830
  - factors in the adoption of ANP 788
  - influences on food beliefs and practices 785, 807, 813
  - influences on infant feeding practices 722, 784, 802, 806, 811, 812, 813, 845
  - patterns and importance in nutrition education 846
  - system and health services development 548
- Sorghum
  - tannin in 752
- Soya bean
  - and products, review of 645, 648
  - as additives in meat products 731, 767
  - based food supplements 692, 716, 730
  - fatty acid composition
    - compared with tempeh 679
    - compared with winged bean 631
  - nutrient composition of 627, 723
    - effect of germination on 701, 723
  - nutritive value compared with other legumes 627, 723
- Soya sauce
  - amino acid composition of 700
  - and other soya bean products 645, 648
  - available lysine in 665
  - benzoic acid content of 651
  - chemical and nutrient composition 637, 641, 651
  - review of 636, 637
  - standard for 637, 641
- Squatter settlements
  - health and nutritional problems of 843
- Starfruit
  - oil, chemical and nutrient composition of 643
- Sterculic acid
  - see* Cyclopropenoid fatty acids
- Sugar
  - and dental caries 616
  - and overnutrition 619
- Supplementary feeding practices 771, 772, 784, 792, 797, 798, 804, 811, 812
  - also see* Infant feeding practices
- Supplementary feeding programmes
  - as nutrition intervention measures 541, 544, 583, 828, 338, 840, 841, 847
  - review of 840, 841, 847
  - also see* Food supplements
- Sweet potatoes
  - vitamin C in 674
- Tannin
  - effect on protein utilisation 752
  - in lentils 761
  - in petai 714, 715
  - in sorghum 752
  - in tea 752
  - in winged bean 761
- Tapioca (cassava)
  - acute poisoning due to consumption of 738
  - carbohydrate for fungi growth 628
  - safety evaluation of 737
  - consumption and endemic goitre 607, 608, 613, 614
  - cyanide in tubers and leaves of 738

- Tea
  - tannin in 752
- Tempeh
  - amino acid composition of 659
  - as a snack food 659
  - fatty acid composition of 679
  - nutritive value of 648, 659, 679
  - compared with unfermented soya bean 679
- Toddler(s)
  - food beliefs and practices for 785, 797
  - mortality rates 539, 550, 834
  - mortality rate as indicator of nutritional status 549, 554, 602
  - nutritional requirements of 531
- Toxicity
  - of aflatoxins 754
  - of cyclopropanoids in various seeds and nuts 740, 748
  - of nitrate and nitrite 756
- Traditional foods
  - review of 722
- Trypsin inhibitor
  - characterisation of 736, 745, 750
  - in legumes 741
  - in lentil 761
  - in maize 736
  - in mung bean 672
  - in petai 714, 762
  - in winged bean 671, 745, 750, 761
- Vegetables
  - caloric value of 718
  - effect of boiling on nutrients in 704
  - effect of processing on nutrients in 686
  - fibre content of 705
  - folic acid content of 709
  - for processing into traditional foods 722
  - lead content of 743
  - nitrate and nitrite content
    - of fresh and processed 756
    - of pickled 768
  - nutrient composition of 686, 704
- Vitamin A
  - deficiency as a nutritional problem 541, 546, 550, 553, 554, 600, 834
  - in liver reserves 599
- Vitamin C
  - See* Ascorbic acid
- Vitamin (s)
  - changes during germination of corn 657
  - in durian 622
  - in fermented foods 666
  - in fruits 699
  - in mushroom 626
  - in new variety of soya bean 723
  - in petai 715
  - also see* Nutrient composition, and individual vitamins
- Weaning food
  - development of 629, 632, 730
  - review of 698
  - nutrient composition of 698, 730
- Winged bean (four-angled bean)
  - nutrient composition of 696, 701, 704, 713
  - effect of boiling on 704
  - nutritive value compared with soya bean 627
- oil
  - fatty acid composition of 631, 671, 685, 596, 713
  - fractionation on TLC 685
  - physico-chemical characteristics 631, 685
  - potential as edible oil 631, 671
  - sterols in 685
- potential as food 627
- seed
  - amino acid composition of 696, 713
  - antinutritional factors in 750, 761
  - germinated and ungerminated compared 696, 701, 713
  - haemagglutinins in 761
  - potential as protein source 745
  - protein content of 671
  - protein quality of 713, 761
    - effect of autoclaving on 761
  - tannin in 761
  - trypsin inhibitor in 671, 745, 750
- tuber
  - amino acid composition compared with tapioca 627

## AUTHORS INDEX

- Abdul H. Halim 736  
 Abdul Malik Abdullah 783  
 Abdul Rahman Haji Kasbon 828  
 Abdul Salam Babji 565, 592, 593, 667, 731, 768  
 Abidin Hamid 753, 754  
 Abraham, S.C.E. 604, 776, 784  
 Abu Kasim 588  
 Adeeb, N. 594  
 Adelina Abdullah 698  
 Adnan, A. 731  
 Ahmad Mustatfa Hj Babjee 838  
 Ahmad J. 594  
 Ahmad Zaharudin Idrus 638, 663  
 Aishah, A. 768  
 Aishah Aziz 641  
 Alagaratnam, R. 650  
 Alexander, G.H. 609  
 Alexander, J.C. 628, 737  
 Ali Wazir Nasib 576  
 Ambok Maek Meri 687  
 Aminah Abdullah 592, 593, 723, 731, 768  
 Andrew Salip Ridu 829  
 Anuwar Mahmud 527  
 Armstrong, M.J. 757  
 Armstrong, R.W. 757, 758  
 Arokiasamy, J.T. 759  
 Asiah Mohd. Zain 724  
 Augustin, M.A. 756  
 Aziz Ibrahim 701  
 Azizah Abdul Razak 792  
 Azizah Ahmad 799  
 Azizah Che' Mat 800  
 Azizun Abdullah 807  
 Balasubramaniam, A. 733  
 Banu, S.Z. 556  
 Baldwin, R.E. 723  
 Bedford, P.W. 585  
 Bender, A.E. 707, 708, 709  
 Bent, B. 561  
 Berry, S.K. 631, 643, 658, 668, 677, 688, 739, 740, 746, 747, 748, 755, 756  
 Bhupalan, F.R. 774  
 Bressani, R. 672, 680  
 Buchanan, R.A. 632  
 Butz, W.P. 547, 555, 582, 845  
 Cagampang, V. 725  
 Chan, A.S.E. 758  
 Chan, M.K.C. 561, 584  
 Chan, P. 534  
 Chandrasekharan, N. 529, 587, 599  
 Che Rahani Zakaria 669  
 Cheah, C.H. 662  
 Cheam, S.T. 586  
 Chee, H.L. 548  
 Chelliah, T. 531  
 Chen, P.C.Y. 561, 567, 611, 612, 777, 785  
 Chen, S.T. 539, 579, 601, 791, 801, 818  
 Cheok, S.S. 738  
 Chew, G.E. 798  
 Chia, J.S. 651, 732, 735, 751,  
 Chin, K.O. 745  
 Ch'ng, G.C. 633, 648  
 Chong, Y.H. 540, 541, 542, 549, 554, 557, 562, 563, 564, 568, 569, 570, 571, 574, 581, 602, 604, 618, 620, 621, 702, 815, 819  
 Coenegracht, I. 823  
 Colley, F.C. 782  
 Campos, R.L. 584  
 Corcoran, J.M. 608, 613  
 DaVanzo, J. 547, 555, 582, 845  
 Dayang Aminah Ali 565  
 Deva, M.P. 545  
 Domaia Zakariya 760  
 Edmund, G. 543  
 Eastman, C.J. 607, 608, 613,  
 Elias, L.G. 672, 680  
 Faridzah Jaafar 572  
 Fatimah Arshad 532  
 Fields, M.L. 657  
 Florencio, C.A. 603  
 Forq, I.H.M. 561, 584  
 Foo, L.C. 557, 562, 563, 604

- Froning, G.W. 667
- George, E. 594
- George, R. 533, 553, 604
- Ghazali Johan 703
- Gobir, S. 573
- Gregory, K.F. 628
- Habicht, J.P. 547, 582, 845
- Hamid Arshat 595
- Hanis Hussein 557, 562, 563, 568, 571, 581, 805
- Hayashi, S.I. 606
- Henderson, B.E. 757
- Heng, L.K. 756
- Ho, M.Y. 745
- Hussin Hj. Zakaria 645
- Ibrahim Hj. Ahmad 633
- Iida, Y. 606
- Ishak Che Long 330
- Ismail Bylay 689
- Ismail Muhd. Salleh 534
- Ismail, N. 670
- Iyngkaran, N. 786
- Jaafar Ali 595, 597
- Jalaludin, S. 741
- Jamuh, G. 770
- Jariah Masud 803
- Jinap Selamat 678
- John, R. 798
- Kandiah, M. 550, 557, 562, 563, 568, 571, 574, 597, 805
- Kandiah, V. 597
- Karnail Singh 566
- Kassim Ismail 528
- Kennedy, E. 589
- Khairuddin Yusof 535, 843
- Khalid Hassan 595
- Khalilah Abu Hassan 793
- Khoo, H.E. 749, 760
- Khor, G.L. 535, 546, 616, 623, 626, 628, 634, 737, 839
- Khor, H.T. 644, 671
- Khor, M.K.S. 787
- Kuladevan, R. 597
- Latif Nasir 717
- Latifah Mohsan 704
- Latiff Rasulpuri 623
- Lee, C.K. 743
- Lee, D.W. 734
- Lee, E.L. 530
- Lee, K.H. 653
- Lee, M. 778
- Lee, M.C.C. 561, 574, 584
- Lee, P.L. 635
- Lee, T.L. 636
- Lee, Y.N. 785
- Leong, G. 831
- Leong, S.H. 690
- Liew, F.Y. 734
- Lim, A. 625, 638
- Lim, B.T. 765, 766
- Lim, C.L. 637, 742
- Lim, H.H. 760
- Lim, P.E. 635
- Lim, P.P.E. 612
- Lim, R.K.H. 557, 562,
- Lo, C.K. 652
- Losos, G.J. 737
- Low, K.S. 743
- Low, T.P. 653
- Lowe, E.S.H. 750
- Lumsden, J.H. 737
- Maberly, G.F. 607, 608, 613
- Madaven, N. 726
- Mahathevan, R. 817
- Maimunah Ismail 788
- Mamat Salleh 840
- Mamot Said 848
- Manderson, L. 794, 795, 796, 802, 803, 812
- Marimuthu, N. 587
- Mat Isa Awang 766
- Maznah Hj. Md. Desa 705
- McKay, D.A. 558
- Medical department Sarawak 832
- Medrano, J.F. 656
- Miller, D.S. 822
- Mitchell, H.I. 736
- Mohan Rao, P.K. 624
- Mohd. Fuad Hj. Othman 761
- Mohd Hashim Hassan 588, 625, 638,

- 645, 646  
 Mohd. Idris Hj. Zainal Abidin 691  
 Mohd. Ishak Djafar 654  
 Mohd. Iskandar 750  
 Mohd. Ismail Abdul Karim 659, 679  
 Mohd. Ismail Noor 655, 656, 672, 680, 820, 822  
 Mohd. Mohd. Lassim 691  
 Mohd. Nordin Abdul Karim 692, 706, 752, 821  
 Mohd. Nordin Mohd. Som 646  
 Mohd. Omar Hj. Salleh 771  
 Mohd. Rusli Zahari 597  
 Mohd. Yunus Jaafar 591, 810  
 Mok, S.K. 564  
 Nafsiah Omar 537  
 Nawalyah Abdul Ghani 596  
 Nazarifah Ibrahim 722  
 Ng. T.K.W. 562, 563, 564, 568, 571, 574, 583, 603, 620, 621.  
 Ngaijan Agale 693  
 Ngui, L.J. 837  
 Nik Daud Nik Ismail 707, 708, 709  
 Nimsakul, S. 576  
 Noor Rehan Abdullah 651, 719, 720, 721  
 Nor Laily Aziz 824, 826  
 Noraihan Othman 710  
 Noraini Ismail 711  
 Noriham Abdullah 727  
 Norlida Mohd. Darus 575  
 Norliza Salleh 712  
 Normah Hashim 657, 691, 813  
 Ogihara, T. 606  
 Oki, K. 606  
 Ong, C.L. 559  
 Ong, F.P.T. 561  
 Ong, H.T. 538  
 Ooi, H.E. 620  
 Oommen, T.T. 841  
 Othman Hassan 629, 789  
 Othman Hussin 694  
 Owens, J.D. 635  
 Padavatan, M. 658  
 Pathmanathan, I. 772  
 Poedijono Nitiwesojo 663  
 Poh, S.C. 797  
 Polunin, I. 605  
 Prabha Joginder Singh 798  
 Prathapa Senan, C. 560  
 Prime Minister's Department 833, 834  
 Quah, S.C. 624  
 Radziah Ariffin 681  
 Rafidah Aziz 775  
 Raj Karim 825, 826, 827  
 Raja Ahmad Noordin 785  
 Rajakumar, M.K. 779  
 Ramasamy, P. 745  
 Ramli Man 744  
 Ramoso, T.L. 573  
 Rampal, L. 846  
 Reade, A.E. 628  
 Robinson, M.J. 530  
 Rohana Ahmad 695  
 Rokiah Hj. Ibrahim 713  
 Rosnah Othman 719, 720, 721  
 Rubiyah Jamil 673  
 Ruby Abdul Majeed 780  
 Rusli Nordin 809  
 Sabturiyah Sulaiman 714, 715, 762  
 Saleha Abd. Jalil 696  
 Salmah Muda 659  
 Salmah Yusof 625  
 Samsuri Abas 718  
 Santos-Nunez, J. 628  
 Satterlee, L.D. 667  
 Sayuwa Awang 767  
 Sedky, A. 623  
 Seow, C.C. 660, 670  
 Shaharuddin Aziz 630  
 Sharifuddin Othman 728  
 Shuhaimi Salleh 763  
 Siti Halijah Mohd. Ali 674  
 Siti Mariam Abdul 590  
 Siti Mizura Shahid 568, 571, 769  
 Siti Nor Yaacob 814  
 Siti Zaharah Husaini 835  
 Sivalingam, P.M. 661  
 Stanton, W.R. 622  
 Subbiah, M. 824

Suhaila Mohamed 600, 715, 762  
 Supasri, R. 603  
 Supramaniam, A. 804  
 Supramaniam, V. 804  
 Suriah Abd. Rahman 565  
 Surinder Singh 578  
  
 Tan, A.T. 562  
 Tan, B.T. 586  
 Tan, L.H. 551  
 Tan, N.H. 745, 750, 671  
 Tan, T.K. 716  
 Tan, Y.K. 614  
 Taoprasert, Y. 573  
 Tee, E.S. 557, 562, 563, 564, 568, 571, 597, 598, 619, 682, 683, 697, 724, 769, 805, 844  
 Teh, K.H. 552  
 Teinboon, P. 576  
 Teng, S.C. 764  
 Teo, P.H. 563, 568, 571  
 Teoh, S.K. 781  
 Teoh, S.T. 561  
 Tong, S.L. 751  
  
 Verghese, F. 544  
 Vohra, P. 741  
  
 Wadsworth, G.R. 577, 580  
 Waite, K.V. 613  
 Wan Hilal Wan Abdul Rahman 836  
 Wassom, C.E. 736  
 Wee, R. 837  
 Wilson, C.S. 773  
 Woo, K.C. 615  
 Wong, K.C. 627, 671  
 Wong, M.L. 806  
 Wong, Y.C. 729  
  
 Yaacob Che Man 692  
 Yao, S.C. 610  
 Yao, V.H. 734  
 Yap, R.C.C. 644  
 Yap, S.B. 561, 564  
 Yeoh, Q.L. 639, 640, 647  
 Yu, M.C. 757  
 Yu Swee Yean 662, 648  
  
 Zahara Merican 639, 640, 641, 651, 666  
 Zainab Hashim 663  
 Zainab Mohd. Hashim 684, 698, 717, 718  
 Zainal Abidin Zulkifly 816  
 Zainol Abidin Mohamad 675  
 Zainun Che Ahamad 730  
 Zaitun Yassin 617, 790  
 Zaliha Othman 685  
 Zanariah Jiman 588, 591, 642, 649, 664, 665, 666, 676, 686, 699, 700, 719, 720, 721, 722, 810, 811, 842, 847, 848,  
 Zawiah Hashim 592, 593  
 Zinal Aznain Yusof 535  
 Zulkafli Hamzah 597





