

CURRENT STATUS OF  
FOOD COMPOSITION DATA GENERATION AND COMPILATION  
IN MALAYSIA

Tee E Siong

Division of Human Nutrition,  
Institute for Medical Research,  
Kuala Lumpur, Malaysia

## SUMMARY

This report discusses food composition data generation and compilation activities in Malaysia, particularly those carried out in the last 5 years. During this period, the collaborative programme between the Institute for Medical Research (IMR), the Malaysian Agricultural Research and Development Institute (MARDI), Universiti Pertanian Malaysia (UPM) and Universiti Kebangsaan Malaysia (UKM) completed the analysis of a wide variety of foods, based on an agreed project protocol, sampling procedures, analytical methods, and data compilation. Towards the end of 1988, sufficient data were generated for the publication of an up-dated Food Table. With nutrient composition of 783 raw, processed and cooked foods, this latest edition of the Table is the most comprehensive thus far available in the country. In full cognizance of the need for continuous interaction between food composition data generators and users, a workshop for data users was organized in late 1988, with the objective of maximising the distribution and effective use of food composition data. Participants also made recommendations for future work in food composition data generation and compilation. Work on the programme is continuing, and current activities place emphasis on providing further input and refinement to the database established. These include analyses of selected nutrients such as carotenoids and vitamin A, cholesterol, dietary fibre and available carbohydrates, as well as improvements to the management of food composition data. Although the programme has achieved an important stage of development, there is still much to be done in order to further improve the food composition database in the country. These include improvement of analytical techniques and quality of data, analysis of new foods in the

market, and studies into other nutrients and non-nutrients that have not been given sufficient attention. The management of food composition data and related information need to be greatly improved for more efficient data storage, update and retrieval.

## 1. INTRODUCTION

Almost ten years have lapsed since a systematic programme for the compilation of a Malaysian Food Composition Table was initiated in 1980. From its humble beginning of a literature survey of available data on food composition, a systematic analytical programme was soon initiated. Data from the analytical programme enabled the publication of the first up-date to the Food Table in 1985, which was a considerable improvement over the preliminary table of 1982. The programme continued smoothly, albeit slowly, and covered a wide variety of raw, processed and cooked foods, enabling the publication of yet another up-date in 1988. This report discusses these activities of food composition data generation and compilation in Malaysia, particularly those carried out in the last 5 years.

The report is divided into 3 sections. The first describes briefly the initiation of the programme in 1980, followed by the major part of the report that discusses in some detail several aspects of current activities of the programme. In the last section of the report, several areas for future studies are highlighted. Through this report, the Working Group for the Compilation of Malaysian Food Composition Table would like to share its experiences with fellow scientists from the other member countries of ASEAN who are also actively pursuing reliable food composition data for their respective countries. It is hoped that this report would contribute to the planning and development of the ASEAN Food Data System.

## 2. BACKGROUND

A systematic programme to compile a comprehensive Food Composition Table for use in Malaysia was initiated in 1980. The first phase consisted of definition of the state-of-the-art of food composition studies in the country, and compilation of a preliminary table for immediate use in 1982 (Tee, 1982). In the second phase, systematic chemical analysis of local foods commenced, and was carried out as a collaborative programme between three institutions, namely Division of Human Nutrition of the Institute for Medical Research (IMR), the Food Technology Division of the Malaysian Agricultural Research and Development Institute (MARDI), and the Faculty of Food Science and Biotechnology of Universiti Pertanian Malaysia (UPM). To execute the programme, a Working Group for the Compilation of Malaysian Food Composition Table was formed, comprising of scientists from the participating institutions. Financial assistance for the analyses was obtained under the ASEAN Protein Project, which was funded by the ASEAN-Australian Economic Co-operation Program (AAECP), and managed by the ASEAN Sub-Committee on Protein. At the end of the second phase, an update to the preliminary table was published in 1985 (Tee, 1985).

The analysis and compilation programme continued for another four years into its third phase, scheduled to terminate in mid 1989. Besides the three institutions mentioned above, the Department of Food Science and Nutrition of Universiti Kebangsaan Malaysia (UKM) also joined in to tackle this huge and seemingly unending task. Continued financial assistance was obtained from the AAECP, under the ASEAN Food Habits Project and managed by the ASEAN Sub-Committee on Protein : Food Habits Research and Development. The climax of the programme is the publication of Nutrient Composition of Malaysian Foods 1988 (Tee et al., 1988).

With the publication of the comprehensive edition of the Food Table in 1988, the systematic programme for the compilation of a Malaysian Food Composition Table has achieved an important stage of development. Work on the programme is continuing, and current activities emphasize on providing further input and refinement to the database established. These include analyses of selected nutrients such as carotenoids and vitamin A, cholesterol, dietary fibre and available carbohydrates. Plans are also being made for studies of trace elements in foods.

### **3. CURRENT ACTIVITIES**

This section discusses several activities carried out in the last 5 years for the generation and compilation of food composition data in Malaysia. These include various aspects of the project for the compilation of Malaysian Food Composition Table from 1985 to 1988, a workshop organised for users of food composition data, and some highlights on several activities currently carried out for further input and refinement to the Table.

#### **3.1 Compilation of Malaysian Food Composition Table (1985-1988)**

##### **3.1.1 Project Protocol**

At the commencement of the third phase of the systematic programme for the compilation of Malaysian Food Composition Table (1985-1988), the Working Group defined the approach to be taken for the task at hand. The 1985 edition of the Preliminary Food Composition Table (Tee, 1985) was used as the basis for the analytical programme in this phase. Foods with complete nutrient composition that were deemed suitable for use were carried over to the final database. Data for a total of 140 foods, mainly raw (unprocessed) foods from the preliminary table were thus

retained. Those foods with minimally incomplete data (mostly minerals and vitamins), and for which similar samples could be obtained, were analysed for the missing nutrients. The majority of the other foods with incomplete data were deleted and new samples obtained for analysis of the full range of nutrients. Various processed foods, including traditional foods were also identified for study. The cooked foods were almost all new analyses in the above mentioned period. For all categories of foods, the choice of foods for study was mainly guided by their importance to the diet of local communities.

After the identification of the categories of foods to be studied in the analytical programme, the workload was shared by the participating institutions, namely Division of Human Nutrition of the IMR, Faculty of Food Science and Biotechnology of UPM, Food Technology Division of MARDI, and the Department of Food Science and Nutrition of UKM. Each institution was allocated specific food groups to analyse all the nutrients tabulated in the Table (proximate composition, 5 minerals and 5 vitamins).

### 3.1.2 Sampling of Foods

Several sampling methods were practised, depending on various factors, including the nature and availability of the foods studied. For most of the raw foods studied, two samples of the foods were purchased from different outlets and each food analysed separately, with analysis of each nutrient carried out in duplicate. In the case of processed foods, wherever possible, at least three different brands were obtained and a composite sample prepared for duplicate analysis. In all cases, mean values were calculated and reported.

For the cooked foods, a minimum of three samples were purchased from different outlets (restaurants or stalls, as the case may be) and analysed individually in duplicate. Mean values were tabulated for foods with identical ingredients and method of preparation.

### 3.1.3 Methods of Nutrient Analyses

In the collaborative project for the Compilation of Malaysian Food Composition Table, the four participating institutions used a set of common methodologies compiled by the INR. They are essentially AOAC methods (Williams, 1984), with modifications made by the INR. Full details of each method are given in a manual which was recently updated (Tee et al., 1987). Methods of analyses and expression of results for some of the nutrients are highlighted in the following paragraphs. Recovery studies, especially in the analysis of vitamins and minerals, were carried out for each batch of analysis, or as frequently as feasible.

### 3.1.4 Data Compilation and Publication

Results generated by the participating laboratories were sent from time to time to the INR for validation and entry into a micro-computer, making use of a programme modified from a commercial software. Print-outs were sent to the institutions for checking of correct data entry. If deemed necessary, the analyses were repeated.

Towards the end of 1988, the Working Group felt that a nutrient composition data for a sufficient number of foods have been generated for another update to the Malaysian Food Table. Printed hard-copies of the Table were made available to users in early 1989 (Tee et al., 1988). The Table presents nutrient

composition for 783 foods, out of which 580 items are raw and processed foods. Data for 203 cooked foods are also tabulated, which include a variety of traditional Malaysian meals, dishes and "Kuih", as well as a number of the so-called "fast-foods". Explanatory notes on the Table and description of cooked foods are included in the compilation. Indexes of foods according to the common names, Bahasa Malaysia names as well as their scientific names are also provided. This edition of the Food Composition Table is the most comprehensive thus far available in the country. An introduction to the use of the Table and the data contained therein is given in an earlier publication (Tee *et al.*, 1989).

### **3.2 Workshop For Users of Food Composition Data**

In full cognizance of the need for continuous interaction between food composition data generators and users, the ASEAN Sub-Committee on Protein : Food Habits Research and Development, and the Institute for Medical Research, jointly organized a Workshop for Users of Food Composition Data From 10-11 October 1988 in Kuala Lumpur. It is realized that it is important to understand the needs of data users, and to maximise the distribution and effective use of data. The Workshop was attended by about 100 participants, comprising of nutritionists, dietitians, food scientists, and educationists. Several papers were presented to provide participants with background information on recent developments in the generation and compilation of food composition data, and the use of these data in various fields, including health and nutrition research, diet history and counseling, and the food industries. A paper on computerised food composition data-base was also presented. A draft version of the updated Nutrient Composition of Malaysian Foods 1988 was distributed and a paper introducing the



publication was presented. In the workshop session, participants discussed a wide variety of issues and made suggestions for improvements to the 1988 Table, as well as recommendations for future work in food composition data generation and compilation. These have been documented in the proceedings of the Workshop (Khatijah and Mohamad Nordin, 1989).

### 3.3 Further Input and Refinement

Several studies were carried out from 1988, emphasizing on selected nutrients and specific groups of foods. These include studies of carotenoids and vitamin A, cholesterol, dietary fibre, and available carbohydrates.

Analysis of various carotenoids in a number of local fruits and vegetables have been carried out using a high pressure liquid chromatography (HPLC) procedure. It is hoped that the method could effect the separation of various carotenoids, thereby enabling more accurate quantitation of these compounds. This in turn would enable more accurate estimation of vitamin A values of these foods. The correct identification of carotene-rich foods is particularly important for low-income communities whose source of vitamin A is mainly from plant foods. The HPLC procedure is also being used for more accurate quantitation of retinol and some carotenoids in foods of animal origin.

There has been continuing concern in the role that dietary fats and cholesterol play in the development of coronary heart disease. The cholesterol content of selected foods and diets are being studied, to meet the increasing demand for such data. A colorimetric method using ferric sulphate-acetic acid reagent is being used, and results obtained compared with a gas-liquid chromatographic procedure.

The usefulness and validity of determination of crude fibre and calculation of carbohydrate values of foods "by difference" has been questioned in recent years. It is felt that the values obtained may not give an accurate picture of the "unavailable carbohydrate" and "available carbohydrate" content of foods. A systematic approach for the simultaneous determination of "dietary fibre" and "available carbohydrate" content of foods was thus initiated.

Other activities currently carried out involve improvements to the management of food composition data. All data in the 1988 edition of the Food Table have been compacted and accommodated in a single database file. Efforts are being made to write a menu-driven programme for easy retrieval and up-date of data in the mini-computer in the IMR. A programme for the calculation of nutrient intake from food consumption studies is also being designed.

#### 4. FUTURE ACTIVITIES

From its humble beginning in 1980 of a literature survey of available data on food composition, the publication of the 1988 edition of the Table signifies the completion of an important stage of development of the systematic programme for the compilation of a Malaysian Food Composition Table. Laboratory analyses have been carried out under various constraints and incurred considerable amounts of expenses. The shortage of manpower and technical expertise for the required analysis have been important constraints. In spite of the success thus far achieved, various short-comings exist for the data presented. Studies in this field will not terminate with the publication of the present Table. With regards to the analytical methods, efforts towards improving the data generated will have to be

increased. For example, greater awareness will have to be given towards sampling methods and improved data quality control system. Variations in results obtained by the various laboratories will have to be quantitated more accurately. Studies into variations in nutrient content of foods from various places of production will have to be carried out.

Food composition tables will have to be updated from time to time. Research and development in the area of analytical methodologies are still advancing at a rapid pace, especially for minerals and vitamins. As improved methods become available, content of various nutrients will have to be re-examined. Analyses will have to be carried out on new food items, especially processed foods, being introduced into the market.

Besides these, the content of other nutrients in foods will have to be studied in the future. In recent years, the importance of several nutrients that have not been tabulated in food tables have been given particular attention. These include fatty acid and amino acid composition, cholesterol content, several trace elements such as selenium, manganese, copper and zinc, and several vitamins such as tocopherol and folic acid. Most of these nutrients have been associated with several diseases, and the demand for knowledge of their levels in foods has been increasing. Interest on the concentration of non-nutrients in foods has also increased in recent years. These include several toxicants and food additives.

Not to be neglected are efforts towards more efficient management of food composition data. As the volume of food composition data and other information on the foods analysed increases, the problem of data management becomes more acute. Steps have been taken to store the entire food composition database in the

main-frame computer for more rapid and efficient data update and retrieval, as well as to facilitate calculation of food consumption data.

It is clear that there is a great deal more to be tackled in the future. A good start has been made; it is next required to move ahead systematically step by step, towards a database that is more complete and that may be used more confidently. In order to achieve this, support and assistance from various quarters are required. Cooperation amongst member countries of ASEAN will certainly contribute towards the common goal of improved food composition databases in the region.

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**PROCEEDINGS**

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FOOD DATA SYSTEM**

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