

Research Priority Area 7

Food Composition Database for
Nutrient and Non-Nutrient
Components



8 FOOD COMPOSITION DATABASE FOR NUTRIENT AND NON-NUTRIENT COMPONENTS

8.1 Introduction

The first and current Food Composition Table (FCT) was published in 1997 (Tee *et al.*, 1997) using data from work carried out between the 1980s and 1990s. It is still used by nutritionists, food scientists, food safety personnel, policy makers and the industry for a variety of purposes, which are listed in Appendix 1. The FCT has complete data on the macronutrients and micronutrients for 580 raw foods and 203 cooked food items.

There is now an urgent need for an improved FCT with inclusion of nutrients and non-nutrients, including bio-active compounds, anti-nutrients, contaminants, toxicants, and additives, which are not available in the current table. A conceptual framework highlighting priority research areas is given in Figure 8.1. At the food / meal / dish level, values might need to be revised as meal ingredients and portion sizes change. Wider varieties of processed foods are becoming available as well as new plant varieties and animal husbandry technology. Therefore, it is timely to have an improved and updated FCT for nutrients and non-nutrients. The improved and expanded FCT will include non-nutrient contents of selected foods.

It is also timely that the FCT is made available as a database with a mechanism for updates by authorised researchers, which could then be made available for all users. The new Food Composition Database (FCD) should first and foremost collate existing data for macro-, micro- and non-nutrients. The second stage would be to add new data to the FCD. Aspects which are currently unavailable in the present FCT must be included, for example, rates of nutrition retention after cooking and food processing, values for cooked dishes, new food items from the East Coast states, Sabah and Sarawak, and functional ingredients. A full list of the research needs are given in Figure 8.1 and described in Table 8.1. The new FCD should be one database for all users. Therefore it should incorporate information on contaminants and additives. All these work will require preliminary work to identify, adapt and validate laboratory methods.

The nature of the FCD meant that the research needs identified here have to be carried out simultaneously. To achieve all these, several research scopes have been given priority rank 1. The basis for ranking is shown in Tables 8.2 and 8.3. One of the mechanisms to achieve an improved FCD lies in workload sharing. A proposed Malaysian FCD Working Group which could be set up is given in Appendix 2.

The availability of an improved FCD will enable a wide variety of food and nutrition related activities to be carried out in the country. It is justifiable to say that most of the identified research priorities in this research area would be dependent on the successful implementation of this work, particularly studies requiring investigation of dietary intakes.



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8.2 Conceptual Framework on the Purpose and Scope of the Research Priority Area

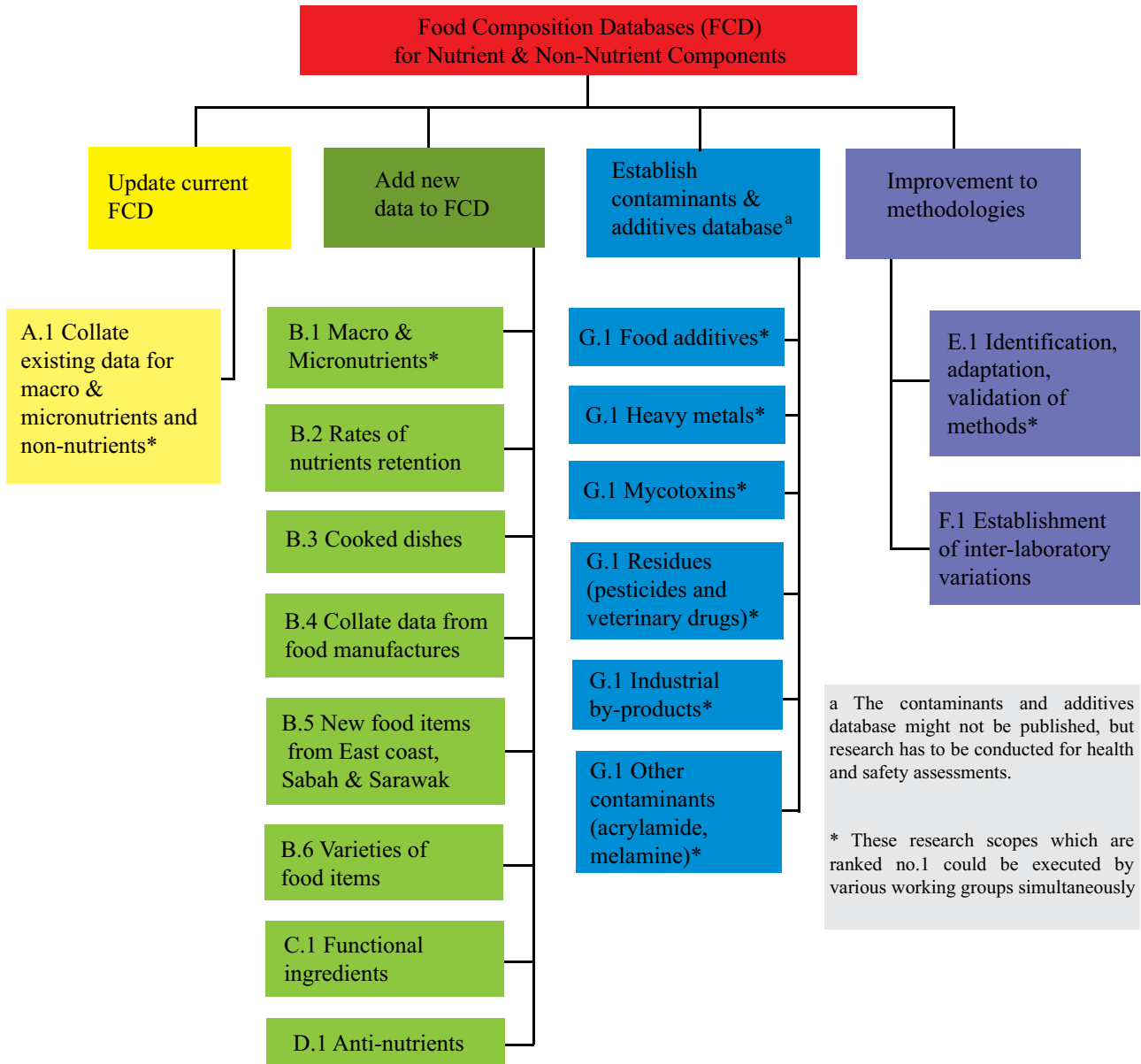


Figure 8.1: Purpose and scope of food composition database for nutrients and non-nutrient components

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Table 8.1: Purpose and scope of food composition database for nutrients and non-nutrient components

Purpose	Research Scope	Suggested Topic and/or Explanatory Notes	Relative Rank (Scope)	Relative Rank (Topic)
Update current FCD	A.1. Collate data on existing fatty acids, macronutrients, minerals, phyto-chemicals of food and non-nutrients into the current FCD	The data is scattered among various laboratories in the country, and there is an urgent need to collate all existing data into one database. This is of utmost urgency and should be achieved using currently available funding.	1*	1*
Add new data to FCD	B.1. Add data on new macro and micronutrients into the database	Incomplete macronutrients in current FCD (sugars, dietary fibre, fatty acid profile including trans-fatty acids) especially in view of an increase of prevalence of NCDs eg. CVD, Diabetes Mellitus, cancers. Micronutrients for eg. iodine, folate, selenium, zinc, haem and non-haem iron, vitamin A in view of the continued prevalence of sub-clinical deficiencies in Malaysia especially among lower socio-economic groups	2	1*
Add new data to FCD	B.2. Add data on rates of nutrient retention after cooking treatment	Information on nutrient profile of cooked food, particularly vegetables, which are currently not available because food lose nutrients through leaching during the cooking process, or certain nutrients become more bio-available after cooking.	2	2
Add new data to FCD	B.3. Add data on wider variety of cooked dishes	Information on nutrient profile of cooked dishes, including their standard recipes and method of preparation, especially when the percentage of Malaysians eating out is increasing. The group anticipates that the percentage of households using readily-prepared meals would be increasing	2	2
Add new data to FCD	B.4. Collate data from food manufacturers	Nutrition information of processed food and fortified food from manufacturers because processed foods are becoming more popular in Malaysian households	2	4
Add new data to FCD	B.5. Add and analyze nutrient content of food items currently not in the FCD	Information on nutrient profile of new food and meals/dishes, especially from East Coast states, Sabah and Sarawak, which are currently not available. In addition to that, information on nutrient profile of 'under-utilised' fruits and vegetables.	2	5
Add new data to FCD	B.6. Expand the varieties available for each food item	Information on nutrient profile of different variation available for certain food items (e.g. rice could be further elucidated with white rice, brown rice, red rice, highland rice, basmati rice, long-grain rice, glutinous rice, various degrees of polished rice, hybrid rice, etc.)	2	6
Improvement to methodologies	E.1. Improvements to methodologies	Identification, adaptation, modification and validation of methodologies to analyse for A, B, and C	2	1*



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Purpose	Research Scope	Suggested Topic and/or Explanatory Notes	Relative Rank (Scope)	Relative Rank (Topic)
Add new data to FCD	C.1. Elucidate types and amounts of functional ingredients in food	Information on amounts and bioavailability of polyphenols, carotenoids, plant sterols and stanols in view of their recognised importance in chronic diseases, particularly CVD and cancers	3	3
Add new data to FCD	D.1. Elucidate types and amounts of food components which might interfere with nutrient uptake and absorption	Examples of anti-nutrients which are lacking are phytates, oxalates, trypsin inhibitors.	4	8
Improvement to methodologies	F.1. Establishment of inter-laboratory variations	Development of Certified Reference Materials (CRM). There is insufficient efforts at the present time but this is required in order for A, B, and C to be carried out by various laboratories throughout Malaysia	5	7
Establish a contaminant database	G.1. Determine the types and amounts of these chemicals in the food for exposure assessments	Collate information on contaminant levels for exposure assessments and HACCP (lead, mercury, mycotoxins, pesticide residues, industrial by-products (PCBs, furans, dioxins), antibiotic residues, acrylamides, food additives with the Food Safety and Quality Division (FSQD) and other research institutions.	6	1*

* Note: The relative ranks for ranking No. 1 could be executed by various working groups simultaneously.

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Table 8.2: Ranking criteria for suggested topics in each research scope

Research Scope	Suggested Topic and/or Explanatory Notes	Ranking Criteria (Score 1-10)*		Ranking Criteria (Score 1-7) - Choose Max. 2 Criteria *				Total Score	Relative Rank
		Big Impact On Health Status and/or Delivery of Services	Great Public Health Significance	Capacity Strengthening	Gap In Knowledge/ Evidence that Necessitates Research	Feasibility, Practicality, Cost and Time	Importance for Client Satisfaction		
A.1. Collate data on existing fatty acids, macronutrients minerals, phytochemicals of food and non-nutrients into the current FCD	The data is scattered among various laboratories in the country, and there is an urgent need to collate all existing data into one database. This is of utmost urgency and should be achieved using currently available findings.	10	10			7	7	34	1
B.1. Add data on new macro and micronutrients into the database	Incomplete macronutrients in current FCD (sugars, dietary fibre, fatty acid profile including trans-fatty acids) especially in view of an increase prevalence of NCDs eg. CVD, DM, cancers. Micronutrients for eg. iodine, folate, selenium, zinc, haem and non-haem iron, vitamin A in view of the continued prevalence of sub-clinical deficiencies in Malaysia especially among lower socio-economic groups.	10	10		7		7	34	1



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		Big Impact On Health Status and/or Delivery of Services	Great Public Health Significance	Capacity Strengthening	Gap In Knowledge/ Evidence that Necessitates Research	Feasibility, Practicality, Cost and Time	Importance for Client Satisfaction		
B.2. Add data on rates of nutrient retention after cooking treatment	Information on nutrient profile of cooked food, particularly vegetables, which are currently not available because food lose nutrients through leaching during the cooking process, or certain nutrients become more bio-available after cooking.	9	10		7		7	33	2
B.3. Add data on wider variety of cooked dishes	Information on nutrient profile of cooked dishes, including their standard recipes and method of preparation, especially when the percentage of Malaysians eating out is increasing. The group anticipates that the percentage of households using readily-prepared meals would be increasing.	9	10		7		7	33	2

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		Big Impact On Health Status and/or Delivery of Services	Great Public Health Significance	Capacity Strengthening	Gap In Knowledge/ Evidence that Necessitates Research	Feasibility, Practicality, Cost and Time	Importance for Client Satisfaction		
B.4. Collate data from food manufacturers	Nutrition information of processed food and fortified food from manufacturers because processed foods are becoming more popular in Malaysian households	6	10			7	5	28	4
B.5. Add and analyse nutrient content of food items currently not in the FCD	Information on nutrient profile of new food and meals/dishes, especially from East Coast states, Sabah and Sarawak, which are currently not available. In addition to that, information on nutrient profile of 'under-utilised' fruits and vegetables.	8	8		7		4	27	5



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		Big Impact On Health Status and/or Delivery of Services	Great Public Health Significance	Capacity Strengthening	Gap In Knowledge/ Evidence that Necessitates Research	Feasibility, Practicality, Cost and Time	Importance for Client Satisfaction		
B.6. Expand the varieties available for each food items	Information on nutrient profile of different variation available for certain food items (e.g. rice could be further elucidated with white rice, brown rice, red rice, highland rice, basmati rice, long-grain rice, glutinous rice, various degrees of polished rice, hybrid rice, etc.)	7	7		7		4	25	6
C.1. Elucidate types and amounts of functional ingredients in food	Information on amounts and bioavailability of polyphenols, carotenoids, plant sterols and stanols in view of their recognised importance in chronic diseases, particularly CVD and cancers.	8	10			7	7	32	3
D.1. Elucidate types and amounts of food components which might interfere with nutrient uptake and absorption	Examples of anti-nutrients which are lacking are phytates, oxalates and trypsin inhibitors.	5	6		7		3	21	8

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		Big Impact On Health Status and/or Delivery of Services	Great Public Health Significance	Capacity Strengthening	Gap In Knowledge/ Evidence that Necessitates Research	Feasibility, Practicality, Cost and Time	Importance for Client Satisfaction		
E.1. Improvements to methodologies	Identification, adaptation, modification, validation of methodologies to analyse for A, B, and C.	10	10	7	7			34	1
F.1. Establishment of inter-laboratory variations	Development of Certified Reference Materials (CRM). There is an insufficient effort at the present time but this is required in order for A, B, and C to be carried out by various laboratories throughout Malaysia.	5	5	7			5	22	7



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G.1. Determine the types and amounts of these chemicals in the food for exposure assessments	Collate information on contaminant levels for exposure assessments and HACCP (lead, mercury, mycotoxins, pesticide residues, industrial by-products (PCBs, furans, dioxins), antibiotic residues, acrylamides, food additives with the Food Safety and Quality Division (FSQD) and other research institutions.	10	10		7		7	34	1

* Note: For Ranking Criteria (Score 1 – 7, 1 = the lowest/worst score)

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Table 8.3: Relative ranks for suggested topic

Research Scope	Suggested Topic and/or Explanatory Notes	Ranking Criteria (Score 1-10)*		Ranking Criteria (Score 1-7) - Choose Max. 2 Criteria *				Total Score	Relative Rank
		Big Impact On Health Status and/or Delivery of Services	Great Public Health Significance	Capacity Strengthening	Gap In Knowledge/ Evidence that Necessitates Research	Feasibility, Practicality, Cost and Time	Importance for Client Satisfaction		
A.1. Collate data on existing fatty acids, macronutrients, minerals, phytochemicals of food, and non-nutrients into the current FCD	The data is scattered among various laboratories in the country, and there is an urgent need to collate all existing data into one database. This is of utmost urgency and should be achieved using currently available funding.	10	10			7	7	34	1
B.1. Add data on new macro and micronutrients into the database	Incomplete macronutrients in current FCD (sugars, dietary fibre, fatty acid profile including trans-fatty acids) especially in view of an increase of prevalence of NCDs eg. CVD, DM, cancers Micronutrients for eg. iodine, folate, selenium, zinc, haem and non-haem iron, vitamin A in view of the continued prevalence of sub-clinical deficiencies in Malaysia especially among lower socio-economic groups	10	10		7		7	34	1



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B.2. Add data on rates of nutrient retention after cooking treatment	Information on nutrient profile of cooked food, particularly vegetables, which are currently not available because food lose nutrients through leaching during the cooking process, or certain nutrients become more bio-available after cooking	9	10		7		7	33	2
B.3. Add data on wider variety of cooked dishes	Information on nutrient profile of cooked dishes, including their standard recipes and method of preparation, especially when the percentage of Malaysians eating out is increasing. The group anticipates that the percentage of households using readily-prepared meals would be increasing	9	10		7		7	33	2



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B.4. Collate data from food manufacturers	Nutrition information of processed food and fortified food from manufacturers because processed foods are becoming more popular in Malaysian households	6	10			7	5	28	4
B.5. Add and analyse nutrient content of food items currently not in the FCD	Information on nutrient profile of new food and meals/dishes, especially from East Coast states, Sabah and Sarawak, which are currently not available. In addition to that, information on nutrient profile of 'under-utilised' fruits and vegetables	8	8		7		4	27	5

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		Big Impact On Health Status and/or Delivery of Services	Great Public Health Significance	Capacity Strengthening	Gap In Knowledge/ Evidence that Necessitates Research	Feasibility, Practicality, Cost and Time	Importance for Client Satisfaction		
B.6. Expand the varieties available for each food items	Information on nutrient profile of different variation available for certain food items (e.g. rice could be further elucidated with white rice, brown rice, red rice, highland rice, basmati rice, long-grain rice, glutinous rice, various degrees of polished rice, hybrid rice, etc.)	7	7		7		4	25	6
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D.1. Elucidate types and amounts of food components which might interfere with nutrient uptake and absorption	Examples of anti-nutrients which are lacking are phytates, oxalates and trypsin inhibitors	5	6		7		3	21	8

* Note: 1 = the lowest/worst score. The relative ranks for ranking No. 1 could be executed by various working groups simultaneously

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References

Tee ES, Mohd Ismail N, Mohd Nasir A & Khatijah I (1997). Nutrient Composition of Malaysian Foods. 4th Edition. Malaysian Food Composition Database Programme, Institute for Medical Research, Kuala Lumpur: 310p.



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Appendix 1: Users of the current Food Composition Tables and urgent needs to be addressed

Users	Scope of Use	Specific Needs to be Addressed
Nutritionists	Community dietary intake and nutritional assessments	Inclusion of macronutrients (e.g. sugars, dietary fibre, fatty acid profile including trans-fatty acids).
	Nutritional surveys	Micronutrients, especially nutrients with marginalised deficiencies in Malaysians (currently unavailable: iodine, folate, selenium, zinc; urgent need for expansion of list: vitamin A)
	Nutrition education to communities and patients	Information on nutrient profile of cooked dishes, including their standard recipes and method of preparation.
		Nutrition information of processed food and fortified food from manufacturers
	Information on nutrient profile of food and meals, especially from East Coast states, Sabah and Sarawak, which are currently not available. In addition to that, information on nutrient profile of 'under-utilised' fruits and vegetables.	
Dietitians	Individual dietary assessments / menu planning	Please refer to the list above.
	Patient counselling / education	
	Compliance evaluation of diet therapy	
Food scientists	Food product development	A more complete database is required. The current FCT does not address the needs of this group.

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Users	Scope of Use	Specific Needs to be Addressed
Food industry, particularly small and medium size industries	Nutrition information panel labelling	Correct portion sizes with accurate nutrient profiles
Health researchers / scientists	Clinical interventions	A more complete database is required. The current FCT does not address the needs of this group.
	Compliance evaluation of feeding trials	
Health education personnel	Health and nutrition education	Correct portion sizes with accurate nutrient profiles
Schools / hospitals / armies	Health and nutrition education within the institutional system	Correct portion sizes with accurate nutrient profiles
	Planning of rations	
Food safety personnel	Exposure assessments	Information on contaminant levels for exposure assessments and HACCP (lead, mercury, mycotoxins, food additives)

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Appendix 2: Proposed set up of the Malaysian Food Composition Database Working Group

Globally, there has always been a great deal of importance given to development of quality and comprehensive food database. The Food and Agriculture Organisation (FAO) has initiated the INFOODS in 1983. Subsequently, regional databases were established for example ASEAN foods, which Malaysia participated since the 1980s. In order to have a viable research and policy tool, as well as diagnostic tool in nutrient adequacy, the database requires periodic updates as highlighted in Chapter 8.

The mechanism to achieve an improved Food Composition Database lies in workload sharing. We propose a group to be set up and named, the Malaysian FCD Working Group. Membership could come from institutions currently actively involved in data generation towards the FCD.

Smaller working groups could be set up along the lines of:

- Macronutrients (particularly sugars, dietary fibre, fatty acids, amino acids)
- Vitamins (particularly vitamin A, folate)
- Minerals (particularly iodine, selenium, zinc, haem and non-haem iron)
- Non-nutrient compounds, functional ingredients, bioactive compounds
- Toxicants, contaminants

Once identified, the groups could agree on common methodology for analyses of each component, and establish acceptable inter-laboratory coefficient of variations.

There must be a continued commitment to update the FCD in a 5-year period cycle, which is in tandem with the INFOODS initiative of the Food and Agriculture Organisation (FAO). The types of commitment envisaged include finance, human resource and capacity building. The model which could be used is the continuous commitment given to the National Health and Morbidity Surveys. In between the periodic improvements, the FCD Working Group established could continue with work in data collation from universities and research institutions.