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Nutrient Composition of Selected Cooked and Processed Snack Foods

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ABSTRAK

Kandungan zat di dalam 27 makanan ringan yang dimasak dan 19 yang diproses telah dikaji. Kebanyakan makanan yang dimasak itu berasaskan bijirin, dibuat daripada tepung gandum, beras dan tepung beras, dan hampir kesemuanya adalah kuih atau masakan tradisional Malaysia. Makanan ringan yang diproses terdiri dari hasil-hasil coklat, bijirin, ikan dan udang. Kandungan 19 zat dalam setiap 100g bahagian yang boleh dimakan telah dibentangkan. Kandungan zat yang terpilih dalam setiap hidangan atau bungkusan makanan juga dibentangkan. Laporan ini bermaksud untuk membantu menambahkan pengetahuan mengenai data komposisi makanan ringan tempatan. Bilangan makanan yang telah dikaji hanyalah sebahagian kecil daripada jumlah yang sedia ada. Memandangkan data seperti ini amat berkurangan, lebih banyak kajian perlu dijalankan dalam bidang ini untuk memenuhi permintaan data yang kian meningkat.

ABSTRACT

Nutrient composition of 27 cooked snack foods and 19 processed snacks was determined. The cooked foods were mostly cereal based, made from wheat flour, rice or rice flour, and almost all of them were traditional Malaysian kuih or dishes. The processed snacks studied were chocolate, cereal, tuber, fish and prawn products. The levels of 19 nutrients were tabulated, expressed as per 100 g edible portion. Selected nutrients in each serving or packet of the foods were also presented. The paper is intended as a contribution to the knowledge on nutrient composition of local snack foods, for which information is still greatly lacking. The number of foods studied is only a fraction of the total number available. More work in this area will have to be carried out, to meet the increasing demand for such data.

INTRODUCTION

The role of snack foods in the nutrition of children in Malaysia has recently been given considerable attention. Tee (1979) had emphasized the importance of selling nutritious snack foods in school canteens. Zanariah (1986) dealt with some aspects of the controversy surrounding the nutritive value of snack foods. Aminah *et al.* (1987) reported the consumption of snack foods by rural primary school children in Kedah. Various newspapers and magazines have also highlighted the issue from time to time.

Data on the nutritive value of snack foods is lacking. The food composition table for use in Malaysia (Tee, 1985) also does not provide figures for these foods. Of late, there has been more studies on these foods. In fact, there has been greater emphasis on studying the nutrient composition of cooked foods in general, to meet the increasing demand for such data (Tee *et al.* 1986). The works of Tee *et al.* (1979) and Mohamad Nordin (1983) provide some data on Malaysian cooked foods, whereas more recently, Zanariah (1986) and Aminah *et al.* (1987) reported the level of some nutrients in selected snack foods.

This report is aimed at contributing to the knowledge on food composition data of local foods. The composition of 19 nutrients of over 40 types of commonly consumed snack foods is reported.

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MATERIALS AND METHODS

A total of 27 samples of cooked snack foods and 19 processed snacks were studied. Most of the foods were obtained from several school canteens in Selangor Darul Ehsan. One sample of each of the cooked foods was taken for analysis, except for cooked meals with different ingredients. For the latter, at least two samples were taken from different canteens and analysed separately. All cooked foods were collected and brought to the laboratory the same morning. For the processed snacks, where appropriate, several brands of the foods were collected. The weight of the edible portion of each serving, or piece, or packet, as the case may be, was recorded. The ingredients of the cooked foods were noted, or enquired from the vendor. For the processed snacks, the ingredients were taken from the packaging. A portion of each food was blended for immediate determination of ascorbic acid. The remainder was blended and aliquots weighed out for the various analyses, carried out in duplicate.

All analyses were performed according to the methods given in the laboratory manual compiled by the Institute for Medical Research (Tee *et al.* 1987). Moisture was determined by the air-oven method; protein by the semi-micro Kjeldahl method; fat was extracted using the Soxhlet apparatus; crude fibre by the acid-alkali digestion method, and ash content was determined after incinerating the food in a muffle. Carbohydrate content was then determined by subtracting from 100 the content of moisture, protein, fat, crude fibre and ash. Energy content of the food was calculated by multiplying the protein, carbohydrate and fat values with the Atwater factors of 4,4 and 9 respectively.

Five minerals were determined on the ash solution prepared from the food. Calcium was determined by titration against potassium permanganate. Phosphorus was determined colorimetrically after reaction with vanadate-molybdate reagent, and iron content was similarly estimated colorimetrically through its reaction with o-phenanthroline. Sodium and potassium were determined using atomic absorption spectrometry.

Vitamin A and carotene were first extracted from the unsaponifiable fraction of the saponification mixture and then chromatographed on a column of alumina. The provitamin and vitamin A thus separated were read separately in a spectrophotometer. Total vitamin A activity in the food was calculated from the sum of retinol concentration and 1/6 the concentration of carotene (WHO 1967), and expressed as μg retinol equivalent (RE). Thiamine was determined using the thiochrome procedure, whilst riboflavin was estimated in a fluorometer. Niacin concentration was colorimetrically determined after reaction with cyanogen bromide and sulphanilic acid. The indophenol dye titration method was used for the estimation of ascorbic acid content of the foods.

RESULTS AND DISCUSSION

Types of Snack Foods and Ingredients

The 27 cooked snack foods analysed are listed in Table 1. Ingredients of the foods studied are also given in the table. Where appropriate, the method of preparation of the food is also indicated. The word 'snack' is used in a broad sense, and the list includes 5 types of foods which may be considered as meals in some context. These include various preparations of *mee, mee-hoon, kuih-tiau* and *nasi lemak*. Different samples of the same cooked meal were separately listed since the ingredients used were different. Based on the main ingredient, the foods studied were divided into three groups. The first group consisted of eleven wheat flour based snacks, and the second group was made up of another eleven foods using rice or rice flour as the main ingredient. Three items based on banana, and two on legumes were placed in the third group. Even in this miscellaneous group, wheat or rice flour was an important ingredient in four out of the five foods studied. Coconut or *santan* was another commonly used ingredient, featured in at least 12 of all the foods studied. Almost all the cooked snack foods examined in this study were traditional Malaysian *kuih* or foods based on local recipes. Hence, their local names are used in this paper.

Table 2 lists the 19 processed snacks analysed. The names of the snacks and the ingredients listed are as given on the wrapper. They have been loosely grouped as chocolate,

TABLE 1
Ingredients of cooked snack foods

Food	Ingredients/Method of preparation
Wheat flour based:	
Cake, plain, cup	Flour, margerine, egg, sugar, baking powder; baked
Cucur badak	Flour, coconut, dried prawn, salt, chilli; deep fried in oil
Currypuff	Flour, potatoes, spices, spring onion, curry leaves; deep fried in oil
Kuih apam	Flour (and rice flour), sugar, yeast, salt, coconut; steamed
Kuih kasui	Flour, brown sugar, salt, coconut, lime-water; steamed
Kuih keria	Flour, sweet potato, sugar, salt; deep fried in oil
Kuih udang	Flour, dried prawn, salt, *kuchai*, bean sprout; deep fried in oil
Sandwich, sardine	Bread (plain), sardine (canned), *ikan bilis*
Fried mee (sample 1)	Mee, bean sprout, egg, mustard leaf; fried
Fried mee (sample 2)	Mee, *ikan bilis*, *kangkong*, onion, chilli; fried
Mee soup	Mee, bean sprout, fish cake, *tau-pok*, parsley, *sambal*, onion; boiled
Rice/rice flour based:	
Buah Melaka	Glutinous rice flour, *gula melaka*, coconut, salt, colouring; boiled
Kuih sri muka	Glutinous rice, *santan*, sugar, flour, salt, colouring; steamed
Pulut panggang/pulut udang	Glutinous rice (boiled), coconut, dried prawn, onion, garlic, dried chilli, *serai*; grilled
Kuih lapis	Rice flour, sugar, *santan*, salt, colouring; steamed
Fried *kuih-tiau*	*Kuih-tiau*, *tau-kua*, bean sprout, eggs, fish cake, chilli, ketchup; fried
Fried mee-hoon (sample 1)	Mee-hoon, bean sprout, *kuchai*, strips of fried egg, chilli; fried
Fried mee-hoon (sample 2)	Mee-hoon, *ikan bilis*, *kangkong*, *sambal*, onion; fried
Fried mee-hoon (sample 3)	Mee-hoon, fishball, mustard leaf; fried
Nasi lemak (sample 1)	Rice with *santan* (steamed), *ikan bilis*, egg, cucumber, chili
Nasi lemak (sample 2)	Rice with *santan* (steamed), *ikan bilis*, *sambal*
Nasi lemak (sample 3)	Rice with *santan* (steamed), *ikan bilis*, *sambal*, cucumber, onion
Miscellaneous:	
Cokodok pisang	Banana, flour, sugar, salt; deep fried in oil
Lepat pisang	Banana, flour, *santan*, sugar, salt; steamed in banana leaves
Pisang goreng	Banana, wheat or rice flour; deep fried in oil
Kuih kasturi	Green bean, rice flour, coconut, egg, sugar, salt; deep fried in oil
Bubur kacang merah	Red beans, sugar; boiled

cereal and tuber, and fish and prawn products, based on their main ingredients. The most popularly consumed are probably the cereal and tuber based products, or the extruded snack foods.

Nutrient Composition of Cooked Snack Foods

Proximate composition of the cooked snack foods, expressed as per 100 g of edible portion, is tabulated in Table 3. Most of the foods were found to have a rather narrow range of energy level of 130 to 255 Kcal per 100 g edible portion, except for cake and the two soup dishes (mee soup and *bubur kacang merah*) which had a moisture content of over 80%. Protein concentration also did not vary widely, with most of the values ranging from about 2 to 5 g. The three exceptions were cake, sardine sandwich and *kuih kasturi*, which had protein level of about 7 g. The cooked foods studied did not have a high fat content, most of them below 9 g, with a median value of 3.3 g. The exceptions were cake and currypuff. Being mostly cereal based foods, they were found to have a fairly high carbohydrate content. Leaving out the two soup dishes, carbohydrate level was found to range from about 23 to 58 g, with a median value of 35 g per 100 g edible portion.

Table 4 tabulates the mineral content of the cooked snack foods, expressed as per 100 g edible portion. Except for 6 items which had a calcium level of below 10 mg, the majority of

the other foods had around 10 to 30 mg per 100 g edible portion. Sardine sandwich had an exceptionally high calcium level of 94 mg. *Kuih kasturi* was found to have an exceptionally high concentration of iron, whilst the others had levels ranging from 0.2 to 2 mg.

The vitamin content of the cooked foods is tabulated in Table 5. Some of the foods were found to have moderate quantities of vitamin A activity, higher than for cereals in general. These are foods that contained animal products as ingredients, and a higher proportion of the vitamin A activity was from retinol. Thiamine and niacin levels in the foods were found to be rather low, compared with levels found in rice, rice flour and wheat flour. Only one of the snacks, *kuih kasturi*, had a vitamin B_1 level of more than 0.1 mg per 100 g sample. On the other hand, riboflavin was not exceptionally low, compared with the cereals mentioned above.

In order to provide a quick reference to the composition of selected nutrients in each serving of the cooked snack foods, these have been calculated and tabulated in Table 6. Portion sizes of the foods showed a general

TABLE 2
Ingredients of processed snack foods

Food[1]	Ingredients[1]
Chocolate products:	
Bola coklat berbiskut	Cocoa powder, edible vegetable oil, sugar, flour
Chocolate wafer (brand 1)	Cocoa, cocoa mass milk, butter, sugar, starch, wheat flour
Chocolate wafer (brand 2)	Cocoa powder, sugar, flour, milk powder, vegetable oil, vanilin, permitted flavouring and colouring
Milk chocolate beans	Cocoa powder, sugar, glucose, permitted colouring
Milk chocolate peanuts	Cocoa, peanuts, vegetable fats, milk powder, 'lincintin' soya, sugar
Cereal and tuber products:	
Corn stick, chocolate flavour	Corn, rice, edible oil, cocoa, cream, salt
Noodle snack, chicken flavour	Wheat flour, palm oil, salt, potato starch, sodium carbodymethyl-cellulose, sodium and potassium carbonate, permitted colour, monosodium glutamate, soya sauce, spices and chicken essence
Pop Corn, durian flavour	Corn, sugar, salt, margarine, milk powder, flavouring and permitted colouring
Snacks, cheese flavour	Maize, cheese, edible vegetable oil, spices, permitted colouring
Snacks, chicken flavour (brand 1)	Corn, edible vegetable oil, artificial chicken flavouring, permitted colouring
Snacks, chicken flavour (brand 2)	Rice, corn, edible vegetable oil, artificial chicken flavouring, permitted colouring
Snacks, chicken flavour (brand 3)	Rice, maize, edible vegetable oil, artificial chicken flavouring, permitted colouring
Potato chips (brand 1)	Potato, vegetable oil, salt and approved flavourings
Potato chips (brand 2)	Potato flour, wheat flour, vegetable oil, permitted flavouring and colouring
Fish and prawn products:	
Fish 'satay'	Fish, starch, salt, sugar, chillies
Prawn crackers	Fresh prawns, wheat flour, vegetable oil, modified food starch, monosodium glutamate, salt
Cuttlefish crackers	Cuttlefish, wheat flour, vegetable oil, starch, salt, monosodium glutamate
Prepared cuttlefish (brand 1)	Cuttlefish, sugar, chillie, pepper, salt, monosodium glutamate
Prepared cuttlefish (brand 2)	Not stated

[1]Name of food and ingredients are as given on the wrapper

trend, in that the *kuih* and similar snacks weighed around 15 to 70 g per serving, whereas for the noodle dishes and *nasi lemak*, serving weights ranged from 100 to 200 g. Nevertheless, there were considerable differences in portion sizes, and hence, there was more variation in the level of most of the nutrients listed.

Nutrient Composition of Processed Snack Foods

Table 7 tabulates the proximate composition of the processed snacks analysed, expressed as per 100 g edible portion of the foods. It can be seen that there is considerable variation in the protein and fat contents of the foods. Carbohydrate level showed less variation, although an extremely low level was obtained for one of the prepared cuttlefish products. Energy level of the foods varied within a rather narrow range of between 300 to 500 Kcal per 100g.

Levels of the 5 minerals determined are tabulated in Table 8. A considerable amount of variation is observed, and there appears to be no general trend, even for items within each sub-group. This is also true for the vitamins (Table 9). Contributions to total vitamin A activity were almost solely from retinol for the chocolate, fish and prawn products. In the case of cereal products, carotene also con-

TABLE 3
Proximate composition of cooked snack foods (per 100 g edible portion)

Food[1]	Energy	Moisture	Protein	Fat	Carbo-hydrate	Crude fibre	Ash
	Kcal	%	g	g	g	g	g
Wheat flour based:							
Cake, plain, cup	435	14.8	7.1	19.8	57.1	0	1.2
Cucur badak	238	46.9	5.5	6.6	39.2	0.7	1.1
Currypuff	330	33.6	4.7	14.7	44.8	0.3	1.9
Kuih apam	193	52.0	2.4	0.4	45.0	0	0.2
Kuih kasui	131	67.2	2.5	0.5	29.1	0.4	0.3
Kuih keria	236	44.2	2.6	3.9	47.7	0.8	0.8
Kuih udang	248	47.5	5.5	8.7	36.9	0.1	1.3
Sandwich, sardine	252	41.7	7.4	5.8	42.6	0.6	1.9
Fried mee (sample 1)	161	60.2	5.5	3.3	27.2	0.1	1.7
Fried mee (sample 2)	148	62.4	4.8	1.4	29.0	0.3	2.1
Mee soup	68	84.9	3.6	2.6	7.5	0.2	1.2
Rice/rice flour based:							
Buah Melaka	201	50.3	3.2	1.2	44.4	0.5	0.8
Kuih sri muka	177	58.3	3.5	2.6	35.0	0	0.6
Pulut panggang/pulut udang	219	48.6	4.0	4.6	40.5	1.5	0.8
Kuih lapis	146	63.7	3.0	0.6	32.2	0	0.5
Fried *kuih-tiau*	170	63.9	5.7	6.4	22.5	0.1	1.4
Fried mee-hoon (sample 1)	138	69.7	2.9	4.0	22.5	0.3	0.6
Fried mee-hoon (sample 2)	166	59.0	3.6	1.2	35.1	0.2	0.9
Fried mee-hoon (sample 3)	158	64.7	3.9	3.9	26.7	0.2	0.6
Nasi lemak (sample 1)	165	62.8	5.6	4.9	24.6	0.5	1.6
Nasi lemak (sample 2)	162	61.7	4.6	2.5	30.2	0.2	0.8
Nasi lemak (sample 3)	149	64.8	4.1	2.6	27.2	0.3	1.0
Miscellaneous:							
Cokodok pisang	254	43.2	3.9	6.3	45.4	0.5	0.7
Lepat pisang	158	60.6	3.2	0.7	34.8	0	0.7
Pisang goreng	184	55.3	1.8	2.1	39.5	0.3	1.0
Kuih kasturi	246	45.1	6.9	7.3	38.2	1.5	1.0
Bubur kacang merah	44	88.2	1.6	0.1	9.2	0.7	0.2

[1]No refuse in all samples

tributed to total vitamin A. As was done for the cooked foods, the composition of selected nutrients in each packet or serving of the processed snacks have been calculated and tabulated in Table 10.

CONCLUSION

No attempt has been made to compare the nutritive value of the two groups of snack foods studied, cooked and processed. Firstly, the number of items studied was too small for a valid comparison. In any case, the nutrients derived from a particular food depend on the quantity consumed. Furthermore, the cost of deriving a quantity of a certain nutrient will have to be taken into consideration.

It is also not the intention of this report to deal with the controversy of the consumption of snack foods, especially among children. It is hoped that the results will provide some understanding on the nutrient composition of these foods. In no way does the report claim to provide representative data for the nutrient composition of the foods studied, since no proper sampling procedure was carried out. It does provide an idea of the order of magnitude of the nutrients tabulated for each type of food. It must, however, be borne in mind that considerable variation in nutrient content could exist among the cooked foods, depending mainly on the composition of the ingredients. This is in fact a major problem with the analysis

TABLE 4
Mineral content of cooked snack foods (mg per 100 g edible portion)

Food	Calcium	Phosphorus	Iron	Sodium	Potassium
Wheat flour based:					
Cake, plain, cup	15	160	0.8	356	38
Cucur badak	27	59	0.8	145	183
Currypuff	26	54	1.3	127	109
Kuih apam	5	27	0.3	844	0
Kuih kasui	55	17	0.4	42	17
Kuih keria	29	59	0.3	81	164
Kuih udang	21	54	0.6	376	41
Sandwich, sardine	94	80	1.6	457	93
Fried mee (sample 1)	13	33	0.8	550	44
Fried mee (sample 2)	27	44	1.1	595	55
Mee soup	15	27	0.5	302	29
Rice/rice flour based:					
Buah Melaka	31	29	2.3	153	59
Kuih sri muka	8	29	0.5	146	37
Pulut panggang/pulut udang	11	40	0.4	171	94
Kuih lapis	7	34	0.4	110	34
Fried *kuih-tiau*	20	53	2.0	366	33
Fried mee-hoon (sample 1)	16	34	0.8	156	38
Fried mee-hoon (sample 2)	34	39	2.0	192	31
Fried mee-hoon (sample 3)	19	16	0.7	92	24
Nasi lemak (sample 1)	41	73	1.2	360	60
Nasi lemak (sample 2)	13	40	0.6	180	48
Nasi lemak (sample 3)	23	50	0.5	251	59
Miscellaneous:					
Cokodok pisang	9	46	0.6	75	162
Lepat pisang	8	21	0.4	57	141
Pisang goreng	7	39	0.6	108	216
Kuih kasturi	28	110	3.4	95	185
Bubur kacang merah	8	14	0.2	3	40

of cooked foods in general. Nevertheless, for many cooked foods, the portion size and ingredients of a particular food from different vendors are rather similar. To enhance the usefulness of data on cooked foods, particular attention will also have to be paid to the listing of ingredients in the food or dish and method of preparation. There has been an increasing demand for data on the nutrient composition of cooked foods, and more intensive work in this area will have to be carried out.

The snack foods analysed in the study are only a fraction of the total number of these foods available. There are many more interesting and delicious Malaysian cooked snacks. Some of them are described in the various recipe and cook books. A comprehensive compilation of all these foods, with their recipes and method of preparation should be useful. For the processed snacks, the industry has been growing rapidly, and knowledge on the nutrient composition of snack foods is still limited.

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TABLE 5
Vitamin content of cooked snack foods (per 100 g edible portion)

Food	Retinol µg	Carotene µg	Vitamin A Activity µg RE[1]	Thiamine mg	Riboflavin mg	Niacin mg	Ascorbic Acid mg
Wheat flour based:							
Cake, plain, cup	65	0	65	0.06	0.05	0.6	1.0
Cucur badak	71	64	82	0.09	0.04	0.7	0.9
Currypuff	40	54	49	0.07	0.04	0.8	1.2
Kuih apam	4	0	4	0	0.03	0.2	0
Kuih kasui	8	0	8	0	0.03	0.3	3.8
Kuih keria	19	57	29	0.08	0.04	0.8	0
Kuih udang	34	35	40	0.07	0.04	1.3	0.6
Sandwich, sardine	46	169	74	0.09	0.07	1.1	1.1
Fried mee (sample 1)	11	23	14	0.01	0.04	0.9	1.1
Fried mee (sample 2)	43	97	59	0.01	0.04	0.4	5.7
Mee soup	14	0	14	0	0.02	0.4	0
Rice/rice flour based:							
Buah Melaka	3	0	3	0	0.05	0.4	1.2
Kuih sri muka	11	0	11	0.01	0.05	0.5	2.0
Pulut panggang/pulut udang	14	72	26	0.02	0.08	1.0	0
Kuih lapis	5	0	5	0	0.05	0.4	1.5
Fried *kuih-tiau*	43	18	46	0.05	0.08	0.2	1.8
Fried mee-hoon (sample 1)	32	87	47	0.02	0.08	0.3	0.1
Fried mee-hoon (sample 2)	39	266	83	0.01	0.04	0.4	1.7
Fried mee-hoon (sample 3)	26	268	70	0.01	0.10	1.9	1.7
Nasi lemak (sample 1)	27	39	34	0.06	0.06	1.2	0.6
Nasi lemak (sample 2)	19	20	22	0.03	0.04	0.8	1.1
Nasi lemak (sample 3)	12	14	14	0.01	0.04	0.5	0.6
Miscellaneous:							
Cokodok pisang	31	35	37	0.06	0.06	0.6	0.9
Lepat pisang	8	201	42	0.06	0.07	3.2	0
Pisang goreng	15	39	22	0.05	0.05	0.8	6.5
Kuih kasturi	20	27	25	0.13	0.07	1.8	0
Bubur kacang merah	10	0	10	0	0.02	0.4	0.7

[1]RE = retinol equivalent

the results of the study. The assistance of the various local health authorities in Selangor Darul Ehsan in obtaining samples for the analysis is greatly appreciated.

TABLE 6
Selected nutrients in each serving of cooked snack food

Food	Weight g	Energy Kcal	Protein g	Calcium mg	Iron mg	Vitamin A activity µg RE[1]	Thiamine mg	Riboflavin mg
Wheat flour based:								
Cake, plain, cup	23	100	1.6	3	0.2	15	0.01	0.01
Cucur badak	29	69	1.6	8	0.2	24	0.03	0.01
Currypuff	22	73	1.0	6	0.3	11	0.02	0.01
Kuih apam	27	52	0.6	1	0.1	1	0	0.01
Kuih kasui	62	81	1.6	34	0.2	5	0	0.02
Kuih keria	38	90	1.0	11	0.1	11	0.03	0.02
Kuih udang	30	74	1.7	6	0.2	12	0.02	0.01
Sandwich, sardine	28	71	2.1	26	0.4	21	0.03	0.02
Fried mee (sample 1)	111	179	6.1	14	0.9	16	0.01	0.04
Fried mee (sample 2)	167	247	8.0	45	1.8	99	0.02	0.07
Mee soup	563	382	20.3	82	2.8	79	0	0.11
Rice/rice flour based:								
Buah Melaka	15	30	0.5	5	0.3	0	0	0.01
Kuih sri muka	53	94	1.9	4	0.3	6	0.01	0.03
Pulut panggang/pulut udang	74	162	3.0	8	0.3	19	0.01	0.06
Kuih lapis	55	80	1.7	4	0.2	3	0	0.03
Fried *kuih-tiau*	200	341	11.4	39	4.0	92	0.10	0.16
Fried mee-hoon (sample 1)	200	275	5.8	31	1.6	94	0.04	0.16
Fried mee-hoon (sample 2)	101	168	3.6	34	2.0	84	0.01	0.04
Fried mee-hoon (sample 3)	186	294	7.3	35	1.3	130	0.02	0.19
Nasi lemak (sample 1)	150	247	8.4	62	1.8	51	0.09	0.09
Nasi lemak (sample 2)	116	188	5.3	15	0.7	26	0.03	0.05
Nasi lemak (sample 3)	172	256	7.1	40	0.9	24	0.02	0.07
Miscellaneous:								
Cokodok pisang	71	180	2.8	7	0.4	26	0.04	0.04
Lepat pisang	90	142	2.9	7	0.4	38	0.05	0.06
Pisang goreng	65	120	1.2	5	0.4	14	0.03	0.03
Kuih kasturi	72	177	5.0	20	2.4	18	0.09	0.05
Bubur kacang merah	230	101	3.7	17	0.5	23	0	0.05

[1]RE= retinol equivalent

TABLE 7
Proximate composition of processed snack foods (per 100g edible portion)

Food[1]	Energy	Moisture	Protein	Fat	Carbo-hydrate	Crude fibre	Ash
	Kcal	%	g	g	g	g	g
Chocolate products:							
Bola coklat berbiskut	517	2.6	10.1	26.6	59.2	0	1.5
Chocalate wafer (brand 1)	515	1.7	4.6	25.1	67.6	0	1.0
Chocolate wafer (brand 2)	565	2.3	5.5	35.7	55.4	0	1.1
Milk chocolate beans	377	2.5	2.2	2.6	86.2	0	6.5
Milk chocolate peanuts	509	6.8	17.2	30.9	40.5	2.6	2.0
Cereal and tuber products:							
Corn stick, chocolate flavour	526	3.9	5.2	28.8	61.5	0	0.6
Noodle snack, chicken flavour	456	3.5	11.0	15.6	67.9	0	2.0
Pop corn, durian flavour	380	4.8	6.9	0.8	86.4	0	1.1
Snacks, cheese flavour	499	3.1	9.3	24.0	61.4	0	2.2
Snacks, chicken flavour (brand 1)	504	3.7	6.2	25.6	62.1	0	2.4
Snacks, chicken flavour (brand 2)	458	6.2	8.0	18.4	65.2	0	2.2
Snacks, chicken flavour (brand 3)	456	6.4	4.8	17.9	68.8	0	2.1
Potato chips (brand 1)	552	5.6	6.4	39.0	43.9	1.7	3.4
Potato chips (brand 2)	407	7.0	6.3	10.5	71.9	0	4.3
Fish and prawn products:							
Fish 'satay'	380	15.2	13.9	12.2	53.7	0.8	4.2
Prawn crackers	424	3.3	6.2	9.8	77.7	0	3.0
Cuttlefish crackers	429	4.1	5.2	10.7	77.9	0	2.1
Prepared cuttlefish (brand 1)	353	9.0	37.5	0.8	49.0	0.2	3.5
Prepared cuttlefish (brand 2)	296	20.9	62.1	3.1	4.9	0.2	8.8

[1]No refuse in all samples

TABLE 8
Mineral content of processed snack foods (mg per 100 g edible portion)

Food	Calcium	Phosphorus	Iron	Sodium	Potassium
Chocolate products:					
Bola coklat berbiskut	166	189	2.2	86	309
Chocolate wafer (brand 1)	89	98	3.8	87	175
Chocolate wafer (brand 2)	157	97	1.5	98	95
Milk chocolate beans	54	38	9.0	36	117
Milk chocolate peanuts	152	245	2.5	83	295
Cereal and tuber products:					
Corn stick, chocolate flavour	29	71	1.4	18	83
Noodle snack, chicken flavour	20	135	1.1	613	88
Pop Corn, durian flavour	18	71	1.5	282	85
Snacks, cheese flavour	111	114	3.3	483	55
Snacks, chicken flavour (brand 1)	14	51	2.6	703	46
Snacks, chicken flavour (brand 2)	8	61	0.8	465	53
Snacks, chicken flavour (brand 3)	6	64	0.8	546	15
Potato chips (brand 1)	17	104	1.4	272	771
Potato chips (brand 2)	34	156	1.0	1152	41
Fish and prawn products:					
Fish 'satay'	81	175	4.1	841	358
Prawn crackers	94	98	1.1	750	116
Cuttlefish crackers	46	81	1.8	527	110
Prepared cuttlefish (brand 1)	51	364	4.6	923	271
Prepared cuttlefish (brand 2)	143	717	6.5	1352	585

TABLE 9
Vitamin content of processed snack foods (per 100 g edible portion)

Food	Retinol µg	Carotene µg	Vitamin A Activity µg RE[1]	Thiamine mg	Riboflavin mg	Niacin mg	Ascorbic Acid mg
Chocolate products:							
Bola coklat berbiskut	8	0	8	0.06	0.39	1.4	3.8
Chocolate wafer (brand 1)	48	0	48	0.06	0.23	1.1	8.8
Chocolate wafer (brand 2)	66	0	66	0.03	0.15	3.6	4.6
Milk chocolate beans	15	0	15	0	0.09	1.1	4.7
Milk chocolate peanuts	57	0	57	0.33	0.40	6.4	1.2
Cereal and tuber products:							
Corn stick, chocolate flavour	54	32	59	0.01	0.10	1.4	3.5
Noodle snack, chicken flavour	66	4	67	0.07	0.05	0.8	16.8
Pop Corn, durian flavour	30	146	54	0.05	0.17	0.7	2.9
Snacks, cheese flavour	74	117	94	0.06	0.25	0	3.9
Snacks, chicken flavour (brand 1)	49	50	57	0	0	0.5	1.7
Snacks, chicken flavour (brand 2)	54	43	61	0	0	0.9	2.3
Snacks, chicken flavour (brand 3)	76	32	81	0	0.13	1.9	0.8
Potato chips (brand 1)	160	0	160	0	0.20	4.2	8.5
Potato chips (brand 2)	48	0	48	0	0.06	3.0	15.2
Fish and prawn products:							
Fish 'satay'	42	0	42	0.02	0.10	2.0	1.2
Prawn crackers	58	0	58	0.03	0.05	1.0	7.0
Cuttlefish crackers	34	0	34	0.01	0.05	0.8	8.7
Prepared cuttlefish (brand 1)	44	9	46	0.03	0.08	2.9	1.2
Prepared cuttlefish (brand 2)	107	0	107	0.02	0.29	7.0	1.2

[1]RE = retinol equivalent

TABLE 10
Selected nutrients in each packet of processed snack food

Food	Weight	Energy	Protein	Calcium	Iron	Vitamin A activity	Thiamine	Riboflavin
	g	Kcal	g	mg	mg	µg RE[1]	mg	mg
Chocolate products:								
Bola coklat berbiskut	15	77	1.5	25	0.3	1	0.01	0.06
Chocolate wafer (brand 1)	14	72	0.6	13	0.5	7	0.01	0.03
Chocolate wafer (brand 2)	14	79	0.8	22	0.2	9	0	0.02
Milk chocolate beans	12	45	0.3	6	1.1	2	0	0.01
Milk chocolate peanuts	80	407	13.8	121	2.0	46	0.26	0.32
Cereal and tuber products:								
Corn stick, chocolate flavour	15	79	0.8	4	0.2	9	0	0.02
Noodle snack, chicken flavour	30	137	3.3	6	0.3	20	0.02	0.02
Pop corn, durian flavour	30	114	2.1	6	0.5	16	0.02	0.05
Snacks, cheese flavour	10	50	0.9	11	0.3	9	0.01	0.03
Snacks, chicken flavour (brand 1)	18	91	1.1	3	0.5	10	0	0
Snacks, chicken flavour (brand 2)	8	37	0.6	1	0.1	5	0	0
Snacks, chicken flavour (brand 3)	8	36	0.4	1	0.1	6	0	0.01
Potato chips (brand 1)	18	99	1.2	3	0.3	29	0	0.04
Potato chips (brand 2)	10	41	0.6	3	0.1	5	0	0.01
Fish and prawn products:								
Fish 'satay' [2]	6	23	0.8	5	0.2	3	0	0.01
Prawn crackers	25	106	1.6	23	0.3	15	0.01	0.01
Cuttlefish crackers	20	86	1.0	9	0.4	7	0	0.01
Prepared cuttlefish (brand 1)	40	141	15.0	21	1.8	18	0.01	0.03
Prepared cuttlefish (brand 2)	4	12	2.5	6	0.3	4	0	0.01

[1]RE = retinol equivalent

[2]per stick

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