Original Article

The KOJACH food frequency questionnaire for Chaoshan, China: development and description

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This paper aims to develop a data-based Semi-Quantitative Food Frequency Questionnaire (SQFFQ) covering both urban and rural areas in the Chaoshan region of Guangdong Province, China, for the investigation of relationships between food intake and lifestyle-related diseases among middle-aged Chinese. We recruited 417 subjects from the general population and performed an assessment of the diet, using a 3-day weighed dietary record survey. We employed contribution analysis (CA) and multiple regression analysis (MRA) to select food items covering up to a 90% contribution and a 0.90 R^2, respectively. The total number of food items consumed was 523 (443 in the urban and 417 in the rural population) and the intake of 29 nutrients was calculated according to the actual consumption by foods/recipes. The CA selected 233, 194 and 183 foods/recipes for the combined, the urban and the rural areas, respectively, and then 196, 157 and 160 were chosen by the MRA. Finally, 125 foods/recipes were selected for the final questionnaire. The frequencies were classified into eight categories and standard portion sizes were also calculated. For adoption of the area-specific SQFFQ, Validity and reproducibility tests are now planned to determine how the combined SQFFQ performs in actual assessment of disease risk and benefit.

Key Words: nutrients, weighed diet records, contribution analysis, multiple regression analysis

Introduction

Three countries of Korea, Japan and China are geographically and historically very close, but have preserved their own cultures and dietary habits for a long time. From an epidemiological point of view, we cannot deny that they also share common environmental and host-specific factors for cancer.[1] To establish a basis for cancer prevention in the Northeast Asian countries bearing a historically common cultural background, a case-referent study on cancers in 2000, based on a standardized epidemiological approach, in Korea (Seoul), Japan (Nagoya) and China (Nanjing, Chongqing, Benxi and Shantou), the so called KOJACH Study. First we developed a Semi-Quantitative Food Frequency Questionnaire (SQFFQ) to be used for the case-referent study of Chaoshan area, China, which aims to assess the intake of energy, macronutrients, dietary fiber, retinol, vitamins C and E, β-carotene, and food groups considered to be important in cancer etiology.[2]

Materials

The Chaoshan region, including Shantou, Chaozhou and Jieyang cities, is located in the east of Guangdong Province of China, with a population of approximately 10 million. People here still retain their own language and traditional culture. We have demonstrated that Nan'ao county in Chaoshan has the highest incidence and mortality rates of esophageal cancer in China.[3] Chaozhou and Jieyang areas were selected, including Nan'ao county, as representative of the countryside, and Shantou as representative of the new city.

Study subjects

We randomly recruited 520 healthy residents aged 30-55 years for participation in our investigation, but only 417 (200 males and 217 females) completed the 3-day WDR survey (70 in Chaozhou, 247 in Shantou and 100 in Nan'ao). The remainder dropped out because of their

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busy schedules or difficulties in recording. The fraction of sampling for the whole region was about 41 per million. Part juniors in the Chaozhou Normal College, staff of the Shantou Disease Preventive and Control Center, the Director General of the Nan'ao Board of Health and some doctors of Nan'ao Hospitals joined in our research team and were responsible for making contact with the subjects. Supervisors examined the completeness and accuracy of the information from the survey.

Dietary assessment

A 3-day WDR (two weekdays and one weekend day) was performed from December 2002 to August 2003, with a 24h recall method also used as a supplement. Raw ingredients in dishes were individually weighed and recorded before cooking, with the exception of cooked foods bought from markets. The leftovers were collected and weighed so that the precise weight of food eaten could be calculated. The completeness and accuracy of information was also reviewed by research nutritionists.

Nutrients of interest

The nutrients of interest comprised 29 items: energy, protein, fat, carbohydrates, dietary fiber, retinol, carotene, vitamin C, vitamin E, folic acid, sodium, potassium, magnesium, calcium, iron, zinc, copper, selenium, phosphorus, saturated fatty acids (SFA), monounsaturated fatty acids (MUFA), polyunsaturated fatty acids (PUFA), oleic acid, linoleic acid, arachidonic acid, linolenic acid, eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA) and cholesterol.

Selection of foods/recipes

Nutrient intakes were calculated by multiplying the food intake (grams) by the nutrient content per gram of food listed in the China Food Composition 2002, compiled by the Institute of Nutrition and Food Safety, China CDC.[4] Where necessary we also used data from the Japanese Standard Tables of Food Composition, 5th revised edition[5] for the nutrient content of foods which were not listed in the China Food Composition, such as folic acid. In the latest version of the China Food Composition, all the nutrient values computed apply to the edible portion of the food. Some parts of foods as purchased are inedible, e.g. skin, stones, etc. Thus, the nutrient content per kilogram of raw food can be estimated. Weights of the bought or cooked foods were first converted into corresponding raw foods and then their nutrient content computed. Since the raw foods in China also exist in Japan we can directly use folic acid content of the Japanese Standard Tables of Food Composition.

The selection of food items for developing the SQFFQ was performed using the same procedure as adopted by Tokudome and his colleagues.[6] At first, contribution analysis (CA) was performed for all nutrients of interest,[6-8] and each food item was listed according to the intake amount of nutrient. We selected food/recipe items with up to a 90% cumulative contribution. Then, multiple regression analysis (MRA) was carried out by adopting the total intake of specific nutrient as the dependent variable and overall amounts of this nutrient from the selected food/recipe items by CA as the independent variables for 417 individuals and secondly choosing foods/recipes with up to a 0.90 cumulative square of the multiple correlation coefficient.[6,8] Finally, we determined food items for the SQFFQ both by CA and MRA. Some food items with up to 0.90 R^2 but very small % contribution were excluded, because they may be marginal for total nutrient intake. The foods contributing less than three nutrients, with relatively small% contributions, were also excluded. The statistical package SPSS for Windows 10.0 (SPSS Inc., Chicago, IL) was employed for the data analysis.

Intake frequency

The food intake frequencies in SQFFQ were classified into seven categories: almost never; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1-2 times per day; and 3 times per day or more.

Portion size

The standard portion size of each food item per meal was determined using the mean amount, typical/standard value or the natural unit. Portion size in SQFFQ was divided into six categories: none, 0.5, 0.75, 1.0, 1.5, 2.0 or more. As estimation of condiment and oil consumption per meal was difficult, four categories were employed: none, less than normal, normal and more than normal. The normal intake was determined as the mean amount in the 3-day WDR, and allocation to less or more than normal was estimated with reference to the standard deviation. We also took pictures of the most representative foods with a standard portion size and made a food model booklet for standardization of the intake amount.

Results

The characteristics of the subjects studied

Table 1 shows the characteristics of the investigated subjects. The mean age was slightly older for the rural than the urban subjects in both genders. Although the mean height was not different, the mean weight and BMI in

Table 1. The characteristics of the investigated subjects.

	Males			Females		
	Rural *N* = 115	Urban *N* = 102	*P*	Rural *N* = 102	Urban *N* = 98	*P*
Age (years)	43.1 ± 6.9	42.4 ± 7.1	0.803	42.9 ± 6.8	41.3 ± 7.7	0.245
Height (cm)	169.7 ± 6.0	170.3 ± 3.7	0.496	158.6 ± 4.2	158.6 ± 4.4	0.417
Weight (kg)	62.0 ± 6.4	65.9 ± 6.8	0.004	53.5 ± 6.3	53.8 ± 6.9	0.175
BMI	21.8 ± 2.2	22.6 ± 2.3	0.003	20.9 ± 2.4	21.5 ± 2.4	0.072

SFA: saturated fatty acid; MUFA: mono-unsaturated fatty acid; PUFA: poly-unsaturated fatty acid; EPA: eicosapentaenoic acid; DHA: docosahexaenoic acid.

urban males were larger than in their rural counterparts, with statistical significance. This was not the case for females.

Intake of energy and selected nutrients

Table 2 shows mean intake and standard deviations for energy, protein, fat, carbohydrate and other nutrients. Geographical variation of energy and major nutrient intake was not apparent in either sex, except for greater intake of dietary fiber in urban males. Urban males and females consumed more vitamin E, MUFA, PUFA, oleic acid and linolec acid than rural subjects. In males, urban subjects consumed more cholesterol, carotene, retinol, rural subjects had greater intakes of sodium, DHA and folic acid, calcium, potassium and linolenic acid, whereas EPA. In females, rural subjects took more zinc and manganese. We compared the consumption of each nutrient with the Recommended Nutrient Intake (RNI) for the first and second degree of work in China.[9] The energy consumption in our urban and rural males was similar to RNI, but with females the values were high. The consumption of protein and fat in both genders of urban and rural areas were higher than the RNI, especially for fat, but that for carbohydrate was relatively low.

Selection of food items

The total number of food/recipe items consumed by all

Table 2. Intake of nutrients by the urban and rural subjects

	Males			Females		
	Rural *N* = 115	Urban *N* = 102	*P*	Rural *N* = 102	Urban *N* = 9 8	*P*
Energy (kcal)	2268±539*	2237±520	0.447	2560±661	2449±635	0.084
Protein (9g)	83.5±26.7	85.5±23.8	0.375	85.0±27.4	91.8±27.3	0.244
Fat (g)	84.7±28.2	90.8±41.8	0.196	103.9±26.9	104.3±40.5	0.121
Carbohydrate (g)	295.1±106.8	271.9±101.1	0.320	327.2±129.8	301.3±111.8	0.758
Dietary fiber (g)	10.2±4.7	10.0±3.7	0.707	9.5±3.6	12.0±9.8	0.017
Cholesterol (mg)	389.1±221.0	352.7±165.2	0.174	344.7±249.8	441.3±217.7	0.004
Carotene (μg)	2576.7±2105.7	2693.8±2009.1	0.675	2566.5±2132.6	3487.0±1872.2	0.001
Retinol (μg)	118.0±84.0	116.6±118.8	0.920	90.4±78.6	137.1±86.5	0.000
Folic acid (mg)	395.6±219.9	357.6±129.9	0.128	375.5±155.0	452.6±172.3	0.001
Vitamin C (mg)	88.4±52.3	80.4±39.6	0.205	96.2±61.0	102.2±38.8	0.416
Vitamin E (mg)	22.7±10.8	27.0±11.7	0.005	24.2±10.9	28.9±11.1	0.003
Calcium (mg)	525.6±191.7	446.8±190.2	0.412	406.9±187.4	505.0±155.1	0.000
Phosphorus (mg)	963.9±311.0	937.2± 216.8	0.468	1042.0±390.2	1099.8±222.0	0.202
Potassium (mg)	1718.0±575.5	1745.0±459.3	0.705	1808.9±666.6	2006.6±453.2	0.015
Sodium (mg)	4584.7±1856.1	4460.9±2297.6	0.660	6091.1±2436.2	4733.4±1590.2	0.000
Magnesium (mg)	298.8±93.4	280.2±63.2	0.090	311.4±104.2	326.7±64.4	0.215
Iron (mg)	23.3± 8.8	22.9± 7.3	0.744	22.7±8.2	25.5±6.8	0.009
Zinc (mg)	12.73± 4.78	11.53±2.80	0.028	13.25±5.42	13.99±3 .5 4	0.256
Selenium (μg)	64.92± 29.60	69.40±37.20	0.322	77.81±42.63	72.55±38.14	0.360
Copper (mg)	2.46±1.53	2.24±1.02	0.227	2.30±1.19	2.38±0.68	0.589
SFA (g)	21.14±7.51	22.83±7.92	0.107	24.12±10.56	25.84±8.78	0.215
MUFA (g)	32.05±10.68	35.83±10.47	0.009	36.53±15.36	42.34±10.26	0.002
PUFA (g)	18.62±8.27	23.01±9.70	0.000	21.90±15.58	26.41±8.92	0.013
Oleic aid (g)	29.40±9.79	33.12±9.76	0.005	33.50±13.74	38.46±9.39	0.003
Linoleic acid (g)	16.76±7.41	20.89±8.76	0.000	18.93±8.63	23.92±8.12	0.000
Linolenic acid (g)	1.64±1.30	1.67±1.46	0.895	1.74±1.62	2.76±2.06	0.000
Arachidonic acid (g)	0.088±0.041	0.087±0.041	0.951	0.092±0.056	0.096±0.047	0.626
EPA (g)	0.038±0.046	0.039±0.036	0.900	0.050±0.041	0.034±0.032	0.004
DHA (g)	0.079±0.100	0.069±0.063	0.385	0.118±0.095	0.072±0.073	0.000

subjects over 3 days was 523 (443 and 417 in the in the urban and rural cases, respectively).The number of food items with up to 90% cumulative contribution for 29 nutrients were 233, 194 and 183 in the combined, urban and rural areas, and those for up to 0.9 cumulative R^2 were 196, 157 and 160, respectively. Then, we combined several food items with similar nutrient contents. Finally, we selected 125 food items for a combined SQFFQ. Alcohol beverages were not included in them, because the number of regular drinkers was very small. However, liquor and beer were intentionally added in this SQFFQ, because they are important dietary factors involved in the risk of diabetes and cancer.[2]

The number of food items selected for each nutrient by CA and MRA are listed in Table 3. The mean numbers by CA were 58, 46 and 48 for the combined, the urban and the rural cases, respectively, as compared with 30, 14 and 72 with the MRA.

List of food items

The percentage contributions of the top 5 foods/recipes for energy, protein, fat and carbohydrate for rural, urban and combined areas are listed in Tables 4 and 5. Rice was the most important food source for energy, protein and carbohydrate intake, accounting for more than one third of the energy, followed by peanut oil, pork, mixed oil and lard, this being similar in both urban and rural areas. One-fourth of protein and more than two-thirds of carbohydrates were also contributed by rice. Peanut oil supplied more than one-fifth of fats, followed by pork, mixed oil, lard, pig chops and rice according to the CA. As for energy, the combined, urban and rural data also demonstrated almost have the same ranking for protein, fat and carbohydrate. According to the category of the China Food Composition 2002, the 125 foods/recipes listed in the SQFFQ comprised: cereals (11 items), legumes (6),

Table 3. The numbers of foods contributing to 29 nutrients with up to 90 cumulative %and 0.9 cumulative R^2

	Cumulative %			Cumulative R^2		
	Rural -	Urban	Combined	Rural	Urban	Combined
Energy	49	51	60	33	22	37
Protein	79	85	94	51	26	55
Fat	23	23	25	150	11	17
Carbohydrate	26	29	33	3	8	77
Dietary fiber	65	61	74	74	13	21
Cholesterol	31	36	37	47	10	12
Carotene	23	21	38	47	12	8
Retinol	25	30	33	28	7	55
Folic acid	53	49	59	40	13	19
Vitamin C	38	27	44	52	17	70
Vitamin E	48	45	54	116	5	16
Calcium	94	93	104	70	19	30
Phosphorus	85	91	102	41	28	51
Potassium	114	99	120	63	36	1
Sodium	13	16	16	145	4	3
Magnesium	86	98	109	41	31	58
Iron	84	94	104	45	22	35
Zinc	72	78	86	41	15	44
Selenium	73	88	96	82	8	22
Copper	76	75	88	91	9	31
SFA	22	22	36	100	10	14
MUFA	16	17	21	70	9	8
PUFA	18	16	23	138	5	113
Oleic aid	15	15	17	142	6	8
Linoleic acid	17	15	18	143	5	8
Linolenic acid	31	28	56	136	1	2
Arachidonic acid(g)	24	32	53	53	17	17
EPA	22	32	51	30	17	23
DHA	14	29	36	24	13	12
Mean	46	48	58	72	14	30

SFA: saturated fatty acid; MUFA: mono-unsaturated fatty acid; PUFA: poly-unsaturated fatty acid; EPA: eicosapentaenoic acid; DHA: docosahexaenoic acid.

Table 4. Percentage contributions of the top 5 foods for energy and protein

Energy						Protein					
Rural		Urban		Combined		Rural		Urban		Combined	
Rice	45.8	Rice	38.2	Rice	41.9	Rice	28.6	Rice	23.6	Rice	25.7
Pork	7.7	Peanut oil	8.9	Peanut oil	7.8	Pork	7.5	Pork	6.6	Pork	6.8
Peanut oil	6.9	Pork	6.9	Pork	7.1	Grass carp	3.4	Beef	4.0	Grass carp	3.6
Mixed oil	4.2	Mixed oil	6.4	Mixed oil	5.3	Egg	3.2	Grass carp	3.8	Egg	3.5
Lard	4.1	Lard	3.2	Lard	3.7	Fish	2.9	Egg	3.8	Beef	2.9

Table 5. Percentage contribution of the top 5 foods for fat and carbohydrate

Fat						Carbohydrate					
Rural		Urban		Combined		Rural		Urban		Combined	
Peanut oil	21.7	Peanut oil	24.2	Peanut oil	22.9	Rice	70.4	Rice	67.5	Rice	70.4
Pork	20.2	Mixed oil	17.6	Pork	17.4	Noodle	3.2	Noodle	3.3	Noodle	3.2
Mixed oil	13.3	Pork	15.7	Mixed oil	15.6	Bread	2.3	Bread	3.0	Bread	2.3
Lard	13.1	Lard	8.9	Lard	11.0	Rice noodles	1.7	Rice noodles	2.1	Rice noodles	1.7
Pork chops	3.7	Pork chops	3.4	Pork chops	3.6	White sugar	1.6	White sugar	1.9	White sugar	1.6

fresh legumes (3), vegetables (13), melons and nightshade (5), cauliflower (1), roots (7), fruits (11), meats (11), poultry (5), milk (2), eggs (3), pickles (4), marine products (16), mushrooms (5), nuts (2), cakes (3), condiments (6), oils (3) and beverages (8). All the items were listed in Table 6 in detail.

Nutrition coverage in the SQFFQ

Table 7 shows the percentage coverage of 29 nutrients by the SQFFQ. The selected food items covered 17, 19 and 16 nutrients with up to 90% of the total intake for the rural, urban and combined SQFFQ, and the lowest coverage percentage of the combined SQFFQ was still 82.7%, for linolenic acid.

Discussion

The present study showed that variation in nutrient consumption between urban and rural subjects in the Chaoshan area was small, and the selected food items for the rural and urban SQFFQs were similar, covered all 29 nutrients with acceptable percentage values. The present results thus revealed that development of a combined SQFFQ for rural and urban populations is feasible. The nationwide survey of China held in 1992 showed the national average energy intake to be higher in urban than in rural areas, especially in those with middle and high incomes.[10] Recent economic improvement may have reduced the variation in diet between rural and urban populations, and increased the amount of nutrient intake in both, but especially in rural individuals.

The total energy intake in males was 2.4% higher in the major nutrients in the present study were 6.4% higher in the urban area and 25.9% higher in the rural area for protein; 15.6% higher and 70.6% higher for fat; 2.1% lower and 1.0% higher for carbohydrate; and 31.9% higher and 15.9% higher for dietary fiber, compared with the respective figures from the nationwide survey. The present urban population took more unsaturated fatty acid from vegetables, and the rural population took more animal fat, although geographical variation in total fat intake was not apparent.

We chose the 3-day WDR method as the "gold standard" to develop a SQFFQ for Chaoshan area, because it is the most efficient method for collecting dietary information at present. To decrease the influence of seasonal variation, we conducted the survey over a period of three seasons (winter, spring and summer), because there is no major climatic difference between the fall and winter. Although the sample size was relatively small, the number of subjects appeared sufficient from previous studies to develop SQFFQs, including ones conducted in China.[6,11,12]

We used the two contrasting methods of CA and MRA to select representative food items for stable food intake. Each method has its own particular advantages and disadvantages.[5,6] The former approach is based on the absolute food and nutrient intakes and is especially suitable for investigation of the associations between absolute nutrient intake and disease risk. The latter, in contrast, is based on variance of nutrient intakes, and is efficient for categorizing individuals. Therefore, the combination of the two methods for food selection should provide a more suitable SQFFQ for assessment of food and nutrient intakes.

We selected 125 food items, including alcoholic beverages, for the combined SQFFQ. Most were frequently consumed by the local inhabitants. Although the coverage rates of all 29 nutrients were over 80%, the potential for overestimation or underestimation does exist, because of the incompleteness of the composition table, and the exclusion of food items, such as some marine products, in the selection for the SQFFQ. In summary, in the present

Table 6. List of foods/recipes included in the semi-quantitative food frequency questionnaire of Shaoshan areas, China.

Cereals	*Melons and nightshade*	66. Pig stomach*	98. Fish-pellet[d]
1. Rice	34. Balsam pear	67. Banger	*Mushrooms*
2. Rice conjee	35. White gourd	68. Ham*	99. Mushroom (dried)
3. Thin rice noodle	36. Tomato	*Poultry*	100. Straw mushroom*
4. Fried sticks	37. Cucumber*	69. Chicken	101. Fungus
5. Noodle	38. Pimiento	70. Geese	102. Laver
6. Rice noodle**	*Cauliflower*	71. Duck**	103. Agaric
7. Instant noodles	39 cauliflower*	72. Chook wing	*Nuts*
8. Corn**	*Roots*	73. Chook claw	104. Pignut
9. Steamed bread**	40. Radish	*Milk*	105. Sunflower seed
10. Dumpling*	41. Bamboo shoot	74. Milk*	*Cakes*
11. Changfen*[a]	42. Carrot	75. Milk powder	106. Bread
Legumes	43. Potato	*Eggs*	107. Biscuit*
12. Soybean milk*	44. Pachyrhizus**	76. Egg	108. Cake*
13. Tofu	45. Ginger*	77. Duck egg	*Condiments*
14. Soybean	46. Garlic**	78. Salted duck egg**	109. Salt
15. Dried tofu	*Fruits*	*Pickles*	110. Monosodium glutamate
16. Mung bean	47. Apple	79. Dried turnip**	111. Soy sauce
17. Black soy**	48. Banana	80. Salted mustard	112. Vinegar**
Fresh legumes	49. Pear	81. Pickled vegetables	113. White sugar,
18. Green bean	50. Lichee	82. Pickled chinese cabbage	114. Fermented fish sauce
19. Kidney bean*	51. Orange	*Marine life*	*Oils*
20. Bean sprout	52. Mandarin orange	83. Yellow croaker**	115. Peanut oil*
Vegetables	53. Peach	84. Grass card	116. Mixed oil
21. Chinese cabbage	54. Mango	85. Marine fish	117. Lard
22. Cabbage mustard	55. Grape*	86. Hair tail	*Beverages*
23. Water shield	56. Guava*	87. Sleeve-fish	118. Distilled spirit
24. Cole	57. Longan*	88. Salted fish**	119. Beer
25. Spinach	*Meats*	89. Red fish	120. Iron kwan-yin tea**
26. Water spinach	58. Pork	90. Carp	121. Baiye tea
27. Greengrocery	59. Pork chops	91. Crucian	122. Phoenix tea
28. Cabbage	60. Beef	92. Eel	123. Oolong tea
29. Celery**	61. Pig bone	93. Shrimp	124. Longjing tea
30. Caraway*	62. Beef-pellet[b]	94. Crab	125. Red tea
31. Watercress	63. Pettitoes	95. Dried small shrimps	
32. Leek*	64. Filet*[c]	97. Dried sleeve-fish**	
33. Shallot	65. Chitterlings		

*Included only in the urban version. **Included only in the rural version. a -Rice flour, vegetable and egg or meat. b -Mixture of beef and potato flour. c -Mixture of meat and flour. d -Mixture of fish and rice flour.

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Table 7. Percentage coverage of nutrients by the SQFFQ

	% coverage		
	Rural	Urban	Combined
Energy	94.3	94.2	93.7
Protein	91.7	90.1	88.4
Fat	95.0	93.5	93.8
Carbohydrate	94.3	95.4	94.6
Dietary fiber	86.5	87.3	87.5
Cholesterol	93.3	88.9	86.3
Carotene	88.7	93.9	90.3
Retinol	91.8	81.7	89.1
Folic acid	91.5	92.8	92.5
Vitamin C	86.3	94.6	91.2
Vitamin E	89.7	88.3	89.4
Calcium	87.3	87.3	88.6
Phosphorus	92.4	90.5	86.4
Potassium	86.8	90.5	88.2
Sodium	97.7	96.1	95.1
Magnesium	89.7	90.9	90.1
Iron	83.5	90.3	89.6
Zinc	90.9	91.9	91.6
Selenium	86.6	83.7	85.8
Copper	87.9	86.8	87.4
SFA	94.7	90.5	92.6
MUFA	96.2	95.6	88.4
PUFA	91.1	91.7	97.6
Oleic aid	96.5	95.7	90.2
Linoleic acid	94.2	92.1	97.6
Linolenic acid	91.2	92.2	82.7
Arachidonic acid (g)	90.3	88.5	92.7
EPA	82.4	80.2	87.6
DHA	88.4	81.9	82.9
Mean	90.7	90.2	90.0

SFA: saturated fatty acid; MUFA: mono-unsaturated fatty acid; PUFA: poly-unsaturated fatty acid; EPA: eicosapentaenoic acid; DHA: docosahexaenoic acid.

investigation we described common intakes of foods and nutrients (=29) in urban and rural areas of Chaoshan Guangdong Province, China, for adoption in an area-specific SQFFQ. Validity and reproducibility tests[13-15] are now planned to determine how the combined SQFFQ performs in actual assessment of disease risk and benefit.

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Original Article

The KOJACH food frequency questionnaire for Chaoshan, China: development and description

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中国潮汕地区 KOJACH 食物频率调查问卷的制定和描述

本研究目的是为中国广东省潮汕地区的城市和郊区制定一份有据的半定量食物频率调查问卷表（SQFFQ），目的是调查中国中年生活方式病和饮食摄入的关系。一般人群中征集了 417 名受试者，记录三天所摄入的各种食物的量。我们采用分布分析和多元回归分析选择食物种类条目，分别高达 90%的分布和 0.90 的 P 值。总的消费食物种类条目有 523 项，其中城市人口里 443、郊区 417，按照实际的食物或者处方消费摄入 29 种营养素。城镇交界处，市区和郊区的分布分析分别选择 233.194 和 183 项食物或处方；多元回归分析分别选择了 196，157，160 项。最后，有 125 项食物确定在最终的调查问卷中。频率分为八个类别，并计算出标准的规格大小。为采用地区特异性的 SQFFQ，正计划测定该问卷的效度和信度，以确定在实际中如何结合 SQFFQ 评估疾病的风险和益处。
本研究目的是根据我们所搜集到的资料来制订一份半定量饮食问卷调查表

关键词：营养素、称重饮食记录、分布分析、多元回归分析。