

## Review

# The transition of Chinese dietary guidelines and the food guide pagoda

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China promulgated her first food based dietary guidelines (FBDGs) in 1989. It was proposed by the standing board of Chinese Nutrition Society. The guidelines consisted of 8 items, each followed by a paragraph of explanation words. The second FBDGs came out in 1997, was expanded to include 3 parts i.e. guide lines for general population, for 7 particular population groups (infants, toddlers and preschool children, school-age children, adolescents, pregnant women, lactating mothers and the aged) and a newly formed food guide pagoda (FGP). The last version of the Chinese FBDGs was compelled by Chinese Nutrition Society in 2007, and proclaimed by the Ministry of Health in early 2008. The new guidelines kept the skeleton of three parts, but expanded remarkably in volume and coverage. The guidelines for the general population consisted of 10 items, each containing: core information, a discussion and reference materials. The guidelines for particular groups contained more subgroups, and more detailed recommendations. The revised pagoda kept the previous food grouping and placement but altered the amount of some food groups. An image of a walker and a cup of water were added to the side of the pagoda. Guidelines-2007 called for more coarse grains and less cooking oil consumption. Physical activity is also strongly recommended.

**Key Words:** FBDGs, dietary guidelines, food guide pagoda, China transition

## INTRODUCTION

China is in rapid social and health transition in the past few decades. Food supply and diversity have increased in both urban and rural areas in association with the economic growth. Accordingly, the prevalence of under-nutrition in children is declining while over-nutrition increases with rapid growth of chronic noncommunicable diseases. The change in dietary pattern of the Chinese population was studied based on data collected in the national nutrition surveys in 1982, 1992 and 2002. The consumption of plant foods has reduced gradually while the consumption of animal food increased. Chinese Nutrition Society delivered the first Food based dietary guidelines (FBDGs) in 1989 and revised it in 1997 and 2007 to reflect the progress of nutrition science and to contra-pose actual dietary and nutrition problems of Chinese populations. The FBDGs has been widely used to educate people in the consumption of a well balanced diet in recent decades, in China.

## THE TRANSITION OF DIETARY INTAKE AND HEALTH STATUS OF CHINESE POPULATIONS

China has experienced a rapid economic growth in recent decades. The total gross domestic product (GDP) was 201.7 billion USD in 1980, 354.6 in 1990, 1079.9 in 2000 and 5685.5 in 2010. The per capita GDP was 309, 343, 945 and 4387 USD respectively in these years. The annual increase rate varied from 3.8% to 10.3% in this period of time.<sup>1</sup> Economic development is sure to bring about changes in the people's dietary intake and nutrition status. The National Nutrition and Health Surveys con-

ducted in 1982, 1992 and 2002 indicated that the daily food intake of Chinese residents had changed remarkably.<sup>2</sup>

Intake of foods, based on data collected in the 3 rounds of national nutrition survey carried; out in 1982, 1992 and 2002; is presented in Table 1. The average consumption of cereals reduced by about 100 g per reference man per day; while that of animal foods increased by about 80 g/reference man/day in 20 years. In comparison, data in 1992 and 2002, the proportion of protein from animal foods and soybean has grown from 17% to 31% of the total dietary energy intake; energy from fat has grown from 19% to 28%, while the energy from carbohydrate has reduced from 71% to 61%.<sup>3</sup>

Physical development of children and adolescents has steadily improved. The National Survey on Students Constitution and Health conducted in 1985, 1995 and 2005 indicated that, from 1985 to 1995, the 50<sup>th</sup> percentile of average height increased by 3.1, 3.5, 2.2 and 2.8 cm for urban boys, rural boys, urban girls, and rural girls aged 7-18 years respectively; and the 50<sup>th</sup> percentile of average weight increased by 3.2, 1.9, 2.0 and 1.3 kg. However, the average height and weight of the rural population is still inferior to that of urban population.<sup>4</sup>

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Manuscript accepted 8 June 2011.

**Table 1.** Daily food intake in China (g/reference man)

Food Category	Urban			Rural		
	1982	1992	2002	1982	1992	2002
Cereals	459.0	405.4	366.0	531.0	485.8	416.1
Vegetables	302.0	319.3	251.9	322.0	306.7	285.6
Fruits	68.3	80.1	69.4	24.4	32.0	35.6
Dairy Products	9.9	36.1	65.8	7.3	3.8	11.4
Animal Food	99.1	174.1	182.6	32.9	65.6	112.4
Oil	26.0	37.0	44.0	15.0	26.0	41.0
Salt	11.4	13.3	10.9	13.2	13.9	12.4

Data Source: China Nutrition Survey in 1982, 1992 and 2002

**Table 2.** The prevalence of chronic non-communicable diseases (per 1000)

	Diabetes	Hypertension	Cerebral-vascular disease	Cardio-vascular disease
1993	1.9	11.9	4.0	13.1
1998	3.2	15.8	5.9	14.2
2003	5.6	26.2	6.6	14.3
2008	10.7	54.9	9.7	17.6

Source: Statistic of health service data, "China Health Statistical Yearbook 2010"

The prevalence of stunting among children under 5 years old decreased from 35.0% in 1992 to 14.3% in 2002 in rural, and from 19.1% to 4.9% in urban areas. The percentage of underweight children under 5 however, was still 9.3% in rural areas and reached 14.4% in some poverty-stricken places in 2002.<sup>5</sup>

The morbidity of chronic non-communicable diseases has been rising year by year in association with dietary changes and insufficient physical activity. As showed in Table 2, the prevalence of diabetes increased 5.6 times, that of hypertension by 4.6 times, that of cerebral-vascular disease by 2.4 times from 1993 to 2008.

### THE DEVELOPMENT OF FOOD BASED DIETARY GUIDELINES IN CHINA

The standing Board of Chinese Nutrition Society (CNS) brought about the first food based dietary guidelines (FBDGs) in China in 1989, and a Food Guide Pagoda (FGP) was established in association with a revision of the FBDGs in 1997. A further revision of the FBDGs and the FGP took place in 2007.

#### *The first FBDGs in China*

The first FBDGs (Guidelines-1989) consisted of 8 entries. Each entry was followed by a paragraph of brief explanation. The entries were: (1) Eat a wide variety of foods, (2) Do not be hungry, and do not eat until too full, (3) Eat the right amount of oil and fats, (4) Add the appropriate amount of coarse grains to staple foods, (5) Use a limited amount of salt, (6) Eat fewer sweets, (7) Moderate alco-

holic drinks, (8) Rationally distribute the daily food intake among the three meals.<sup>6</sup>

Where after, a set of eight posters were designed, each was corresponding to one entry of the guidelines. The Chinese Nutrition Society made great efforts to popularize the "Guidelines-1989", they delivered the posters to schools, to governmental agencies and to as many public locations as possible. However, without governmental input and social support, the awareness of the "Guidelines-1989" had not been as far-reaching as hoped.

#### *The second FBDGs in China*

The second FBDGs in China (Guidelines-1997) was a collective contribution of a large group of known nutritionist organizes by the Chinese Nutrition society. They made a thorough review of literature in conjunction with establishing FBDGs, and studied the methodology used in calculating the average food requirement of the populations etc. A monograph of the research papers was published as the scientific basis of the Chinese Dietary Guidelines, 1997.<sup>7</sup> After several years of critical thinking and scientific analysis the "Dietary Guidelines and Food Guide Pagoda for Chinese Residents: Balanced Diet, Rational Nutrition, and Health Promotion" was adopted by the Standing Board of the Chinese Nutrition Society on April 10th, 1997.<sup>8</sup> Guidelines-1997 included three parts, i.e. the dietary guidelines for general population, recommendations for particular groups of people and the food guide pagoda.

### The guidelines for the general population

The Guidelines for the General Population are based on current knowledge of nutrition science and the nutritional requirements of the Chinese people, as well as the main problems existing in Chinese diets. It consists of eight items:

#### *Eat a variety of foods, mainly cereals*

Five groups of food should be included in the diet, they are: cereals and tubers group, vegetables and fruits group, animal foods group, beans and bean products group, and pure energy-providing foods.

#### *Consume plenty of vegetables, fruits and tubers*

More importance was attached to dark-colored vegetables and tubers in this item. Dark-colored vegetables contain more vitamins and certain minerals than do light-colored ones and common fruits. Tubers are rich in starch, fiber and a variety of vitamins and minerals. During the 1990s, consumption of tubers by Chinese residents had declined.

#### *Consume milk, beans or dairy- or bean-products every-day*

The calcium intake of Chinese people is only about one-half of the Chinese Recommended Dietary Allowance (RDA). Great efforts should be made to promote the production and consumption of milk and milk products. Consumption of more beans especially soybean and bean products was strongly encouraged. It is good for increasing the protein intake of rural residents and to prevent unhealthy effects as a result of over-consumption of meat in urban area.

#### *Consume appropriate amounts of fish, poultry, eggs and lean meat; reduce fatty meat and animal fat in the diet*

In the 1980s and early 1990s, the consumption of animal products was inadequate by a fairly large proportion of urban residents and by the majority of rural residents in China. In some big cities, some residents were eating large amounts of animal foods and too little cereals and vegetables. The recommendation to consume "appropriate amounts" of animal food will benefit the both end of the population.

#### *Balance food intake with physical activity to maintain a healthy body weight*

Food intake and physical activity are the two primary factors which determine body weight. Both overweight and under-weight are unhealthy. Physical exercise can strengthen the cardiovascular and respiratory systems, sustain a good physiological state, increase work efficiency. Sedentary people should strengthen their bodies by participating in appropriate sports regularly.

#### *Choose a light diet that is also low in salt*

A light diet means the diet is composed of less fat and oil, less salt, and less animal foods. The prevalence of hypertension goes up continuously. Other dietary sources of sodium such as high sodium seasoning and sodium-containing manufactured foods should be taking into account for controlling salt intake.

*If you drink alcoholic beverages, do so in limited amounts*  
Long-term, excessive drinking reduces appetite and food intake, and therefore can cause multiple nutrient deficiencies, and even hepatic cirrhosis. Heavy drinking should be strictly forbidden. Pregnant women, children and adolescents should not drink alcoholic beverages at all.

#### *Avoid unsanitary and spoiled foods*

When selecting foods, one should choose clean foods with normal color and normal smell. When dining out, pay attention to sanitary conditions, including the dining environment, tableware and the server's health.

### The recommendations for particular groups of people

For specific requirements for groups of people who have different nutritional needs, the Expert Commission proposed "The Dietary Guidelines for Particular Groups of People" as a supplement to the "Guidelines for the general population". Two or three particular recommendations were given to each group in connection with their particular physiological status and nutrition needs.

#### *Infants*

- a. Breast feed infants as much as possible
- b. Add weaning foods in a stepwise manner after four to six months of breast-feeding

#### *Toddlers and preschool children*

- a. Drink cow's milk every day
- b. Start establishing healthy eating habits

#### *School-age children*

- a. Consume a breakfast of high nutrient quality
- b. Consume less snack and high-sugar beverage
- c. Participate in abundant outdoor activities

#### *Adolescents (Teenagers)*

- a. Increase intake of cereals to provide sufficient energy
- b. Ensure adequate intake of fish, meat, eggs, milk, beans and vegetables
- c. Active physical activities and refraining from unhealthy, weight-reduction dieting

#### *Pregnant women*

- a. Ensure sufficient energy intake from the beginning of the second trimester of pregnancy
- b. Maintain a normal increase of body weight during the later stage of pregnancy
- c. Increase the intake of protein rich foods such as fish, meat, eggs, and milk, seafood and soy products

#### *Lactating mothers*

- a. Ensure sufficient energy
- b. Increase intake of protein rich foods such as fish, meat, eggs, milk, sea-foods and soy products

#### *The aged*

- a. Consume easily digestible foods along with some foods made of coarse grains
- b. Participate in moderate physical activities to keep intake and output of energy in balance

### Picture the guidelines

To help consumers put the guidelines into practice; the Commission proposed a program of daily food recommendations and presented these in the form of a Food Guide Pagoda (FGP-1997). (Figure 1) It was designed on the basis of the “Dietary Guidelines for Chinese Residents”. The principles of a balanced diet are expressed in relative amount of a variety of specific foods. The Food Guide Pagoda is visually illustrating what food groups and how much of each should be consumed in daily life.

The five levels of the Pagoda contain all the major groups of foods in the Chinese daily diet. The placement and area of each level of the Pagoda mainly reflect the position and proportion of each group of foods in the daily diet. The amounts of each food group on different levels of the Pagoda are shown in Figure 1.

In general, the amounts of foods recommended in the Pagoda are based on raw weights. Foods are grouped according to actual observation from a nationwide nutritional survey. The weights shown are average values for each food group rather than the weight of a particular food.

The Pagoda recommends a relatively ideal dietary pattern. The amounts of foods proposed, particularly those of milk and beans, exceed those actually consumed by people living in economically underdeveloped areas. Although nationwide realization of the ideal dietary pattern is not practical currently, its achievement is a goal to be strived for, in order to improve the nutritional status of the Chinese people.

#### ***The recent Chinese dietary guidelines***

“Dietary guidelines for Chinese residents 2007” is the most recent Chinese FBDGs. It was compiled by Chinese Nutrition Society and proclaimed by the Ministry of Health in January 2008. The governmental bulletin states that: along with rapid socio economic development, im-

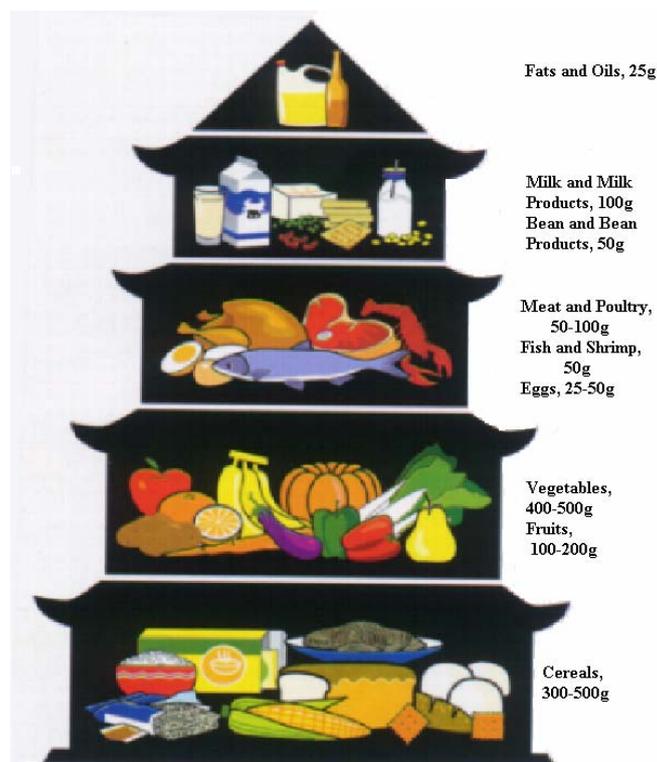
portant changes of the dietary pattern and lifestyle of the residents have occurred. To provide basic, scientific information on a balance diet, to spark plug a healthy lifestyle in the residents’ consciousness, the Ministry of Health consigned the Chinese Nutrition Society constituting the “Chinese Dietary Guidelines” (2007) and the “Food Guide Pagoda for Chinese Residents” (2007).

Two years’ hardship of the editorial board of 25 known Chinese nutritionists, headed by Keyou Ge, supported strongly by a secretariat of nine professionals, brought about the publication of the “Guidelines” (2007) and the “Pagoda” (2007). The new version of Guidelines/Pagoda was a revision of the 1997 one, and maintained the basic skeleton of three parts, but made through changes and expanded tremendously in its volume and coverage in all three parts.

In the preparation of the new guidelines and pagoda, authors were required to reflect, in their manuscript, the progress of nutrition science in the past 10 years, to identify current dietary trends and nutritional problems of the Chinese residents, to aim at clarifying the current misunderstandings on foods by the consumers and to use simple clear language and give quantitative suggestions as much as possible. Thus, to ensure the authority, the scientific quality and the practicability of this new version.

#### **The guidelines for the general population**

The guidelines for the general population includes ten entries. Each entry contains the “summary” which presents the core information and the most important views in the entry; the “discussion” interprets the main content and practical problems under multiple headings; the “tips” which deals with the definition or concept of certain terms and also some side knowledge which is not feasible to be included in the body of the text; and “refer-



**Figure 1.** Chinese Food Guide Pagoda 1997

ence materials” such as scientific evidence or research results which had not been completely inconclusive but of certain reference value. The ten entries are:

- Eat a variety of foods, mainly cereals including appropriate amount of coarse grains
- Consume plenty of vegetables, fruits and tubers
- Consume milk, soybean or dairy- or soybean-products everyday
- Consume appropriate amounts of fish, poultry, eggs and lean meat
- Use less cooking oil; choose a light diet which is also low in salt
- Do not over eat, exercise every day, and maintain a healthy body weight
- Rationally distribute the daily food intake among the three meals, correctly chose snacks
- Drink sufficient amount of water every day, rationally select beverages
- If you drink alcoholic beverages, do so in limited amounts
- Choose fresh and sanitary foods

### The recommendations for particular groups of people

The recommendations for particular groups of people were much more detailed in this version than the Guidelines-1997. There are more sub-groups and more recommendations for each group. In very brief, they are:

#### *Dietary guidelines for pregnant women and lactating mothers*

- a. Dietary guidelines for women pre-pregnancy
- b. Dietary guidelines for women during early pregnancy
- c. Dietary guide lines for women during mid- and late pregnancy
- d. Dietary guidelines for lactating mothers

#### Dietary guidelines for infant and children

- a. Dietary guidelines for infants of 0-6 months
- b. Dietary guidelines for infants of 6-12 months

c. Dietary guidelines for children of 1-3 years

d. Dietary guidelines for preschool children

#### *Dietary guidelines for school children*

- a. Take three meals regularly, ensure a nutritious breakfast, avoid unreasonable bant
- b. Consume foods which are rich in iron and vitamin C
- c. Participate in sufficient outdoor activities every day
- d. No smoking, and no drinking alcohol

#### *Dietary guidelines for the aged*

- a. Consume easily digestible foods along with some foods made of coarse grains
- b. Arrange three meals carefully to elevate the quality of life
- c. Attach importance to prevent anemia and under-nutrition
- d. Participate in more outdoor activity, and maintain healthy body weight

### Food Guide Pagoda 2007 (FGP-2007)

The main body of the FGP-2007 was generally the same as that of the 1997 one, but adds aside a figure of a person waking on a running track and an impersonate water drop who holds a cup of water (Figure 2). These revisions were made to illustrate the important changes of the Guidelines 2007. The revisions are made on the basis of recent progress in nutrition science and the practical food and nutrition problems experienced by the Chinese people. Future prospects of food production and health status in China were also considered.

There is no difference in food grouping or location between the FGP-1997 and FGP-2007, there are indeed differences in the recommended daily amount of some food groups. FGP-2007 proposed increased amount of milk and milk-products, aquatic products and fruits; decreased amount of meat and poultry and staple foods. In addition, a daily amount of drinking water of 1200 ml appeared for the first time with the Pagoda. A table is attached to the

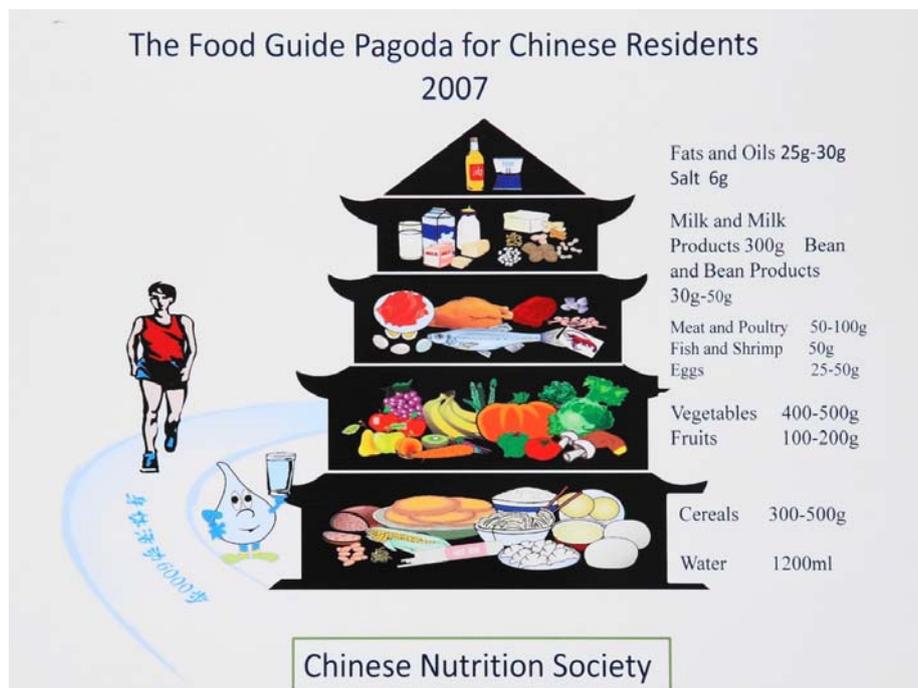


Figure 2. Chinese food Guide Pagoda 2007

application of the FGP-2007, suggesting the appropriate amount of various food-groups according to different levels of energy requirement. (Table 3)

These proposed intakes will provide a rational amount of various nutrients which will meet in general requirements of the Chinese population. The amount of nutrients, as presented in table 4, was calculated based on the Chinese food composition Table.<sup>9</sup> All changes in FGP-2007 are in line with the important changes in the Guidelines-2007.

### IMPORTANT CHANGES IN “DIETARY GUIDELINES, 2007” AND THEIR SCIENTIFIC BASIS

The Guidelines 2007 showed some important changes in comparison with the Guidelines 1997. Some points regarding the guidelines for the general population should particularly be discussed.

#### *Adding “including appropriate amount of coarse grains” to the first item “Eat a variety of foods, mainly cereals”*

The data collected in the national dietary surveys indicated that the consumption of cereals, particularly that of coarse grains reduced dramatically in recent years. The national average daily intake of cereals reduced from 510 g/reference man in 1982 to 402 g in 2002. Among this, the amount of coarse grains reduced from 104g to 24g in the same time period.<sup>10</sup> Coarse grains are rich in some vitamins, minerals, dietary fiber and phytochemicals. Most of them are of lower glycemic effect and good for weight control. Reduction of cereal consumption, especially of coarse grains, is unhealthy. Add “including appropriate amount of coarse grains” to the first item is to remind people to consume more coarse grains, so as to stop or reverse this unhealthy dietary trend. The guidelines propose to have coarse grains, including whole grains, no less than 50 grams per day for adults.

#### *Add “use less cooking oil” prior to “choose a light diet which is also low in salt”*

The survey data showed a remarkable increase in cooking

oil consumption in the past 20 years. It was 18 g/reference man/day in 1982, was 29 g in 1992 and 42g in 2002. It increased by 1.69 times in urban areas and by 2.73 times in rural areas in 20 years. Dietary fat intake was also grew remarkably during this period of time; the national daily average was 48.1 g, 58.3 g, and 76.2 g/reference man in 1982, 1992 and 2002, respectively. In association with the dietary transition, weight gain of the Chinese people was evident for both urban and rural adults. The body mass index moved up by 0.3 kg/m<sup>2</sup> to 1.5 kg/m<sup>2</sup> in the population groups from 1992 to 2002.<sup>11</sup> Adding this phrase “use less cooking oil” to item 5 is to emphasize that too much cooking oil have been used, less amount of oil should be used for a healthier body weight.

#### *Attached great importance to physical activity was an outstanding point*

Item 6 described the importance of physical activity versus exercise and sports. An accumulated daily amount of physical activity equals to 6000 steps of walking was recommended as the basic requirement, which is necessary for keeping fitness.<sup>12</sup> In addition, a middle intensity sport, four times a week and 30 minutes for each time, is appreciable for a better function of the circulatory, respiratory and movement systems.<sup>13</sup> On the other hand, labor intensity become lighter in professional work, in both urban and rural China; and people follow a more sedentary lifestyle. Only 15.3 % of males and 13.1% of females aged 6 years and above regularly exercised (20 minutes or more per day), but 94.9 % to 97.6% urban young adults (aged 20-44 years) and 94.3% to 94.7% rural young adults watched television every day. Among them, 34-40% in urban areas and 23-37% in rural areas watch television for 3 hours or more every day.<sup>14</sup> The proportions of children and adolescents who watched television < 1 h/d, 1-2 h/d, 2-3 h/d and > 3 h/d were 32.2 % , 46.1 % , 15.1 % and 6.1 % respectively, based on data collected from 4 cities. The television viewing time of children and adolescents living in urban China has reached the levels that were seen in developed countries.<sup>15</sup> Guidelines-2007 put forward “exercise every day” in item 6, and the FGP-2007

**Table 3.** Recommended food intake based on energy requirements (g/d)

	6700 kJ (1600 kcal)	7550 kJ (1800 kcal)	8350 kJ (2000 kcal)	9200 kJ (2200 kcal)	10050 kJ (2400 kcal)	10900 kJ (2600 kcal)	11700 kJ (2800 kcal)
Cereals	225	250	300	350	350	400	450
Soy & nuts	30	40	40	40	40	50	50
Vegetables	300	350	350	400	450	500	500
fruits	200	200	300	300	400	400	500
Meat & poultry	50	50	50	75	75	75	75
Milk	300	300	300	300	300	300	300
Eggs	25	25	25	50	50	50	50
Aquatics	50	75	75	75	75	100	100
Fat & oil	20	25	25	25	30	30	30
Salt	6	6	6	6	6	6	6

added a walking figure aside the pagoda appeal strongly to people to adopt regular exercise.

### *Drink sufficient amount of water*

People, especially young people drink more and more sugar-containing beverages in China. A questionnaire survey was conducted among 9194 students, aged 6-17 years old, selected from 7 representative cities by stratified multistage cluster random sampling. The daily average water consumption was 930 ml; and the average beverage consumption was 715 ml per capita. Over 60% of the secondary school students drank carbonated beverages at home.<sup>16</sup> A sample of 100 college students were surveyed in 2009, 70% of them drink mainly boiled water. However, only 20% of them know the possible harmful effects of sugar-containing beverages.<sup>17</sup> Soft drinks contribute remarkably to the weight gain of children and adolescents, and the proportion of overweight children is increasing.<sup>18</sup> The Dietary Guidelines-2007 put forward a new item: drink sufficient amount of water every day, and rationally select beverages. It is to appeal to people, especially young people, to drink plenty of water rather than beverages, and select drinks wisely to avoid the high sugar-containing ones.

### CONCLUSION

The Chinese Nutrition Society initiated the food based dietary guidelines in China in the late 1980s, and revised the guidelines about every 10 years. An expert committee that consisted of around 30 professionals had worked hard to make the guidelines in line with the progress of nutrition science, and in connection with the changing practical food and nutrition problems of the Chinese people. A food guide pagoda was designed in 1997 and revised in 2007, which is visually showing the food categories and the right amount to be consumed for each category, for a balanced. Consumption of more coarse grains, of less oil and doing more physical activities were emphasized in the latest version of the Chinese dietary guidelines.

### ACKNOWLEDGEMENT

This article is based upon the Chinese Dietary Guidelines 1997 and 2007. All experts worked in the commissions made invaluable contributions to these documents. Without their great efforts this article cannot materialize. It is impossible to place all of their names down as an author but every one of them is indeed an author of this paper behind the curtain. My workmates Ms. Zhang Xin and Ms. Dong Fei gave strong support in collecting statistics and references.

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## 中国居民膳食指南和平衡膳食宝塔的变迁

中国营养学会常务理事会于 1989 年发布了第一个以食物为基础的膳食指南。这个“我国的膳食指南”共有八条，每条附有一段简要说明。第二个指南——中国居民膳食指南及平衡膳食宝塔，于 1997 年由中国营养学会公布。此指南扩展为三部分：一般人群膳食指南（八条）；七个特定人群膳食指南（婴儿、幼儿、学前儿童和学龄儿童、少年、孕妇、乳母和老年人）及新设计的“平衡膳食宝塔”。近期的“中国居民膳食指南及平衡膳食宝塔”于 2007 年完成，2008 年初由中国卫生部正式发布。指南 2007 保留了上一版指南的框架，但对每一部分都做了扩展。一般人群膳食指南共有 10 条，每条都包含提要、讨论、提示和参考资料几个部分。对特定人群的分组更加细化，建议更为具体。平衡膳食宝塔的食物分组和位置安排没有改变，部分食物的建议摄入量有所变动。重要的变化是在宝塔旁加了一个走步的人和一杯清水，反映对运动和饮水的重视。比较指南 2007 和指南 1997，更强调要多吃粗粮，少用烹调油和加强身体活动。

**关键词：**中国居民膳食指南、膳食指南、平衡膳食宝塔、中国、变迁