

State of Nutrition in China

Erika Platte

Introduction

This article examines two complimentary aspects in order to obtain a complete picture of the nutritional status of China's population. They are not mutually exclusive and both indicate the extent of malnutrition. The first aspect refers to food availability and consumption including the structure of the diet, while the second one deals with the manifestations of malnutrition.

As in the remainder of the developing world, malnutrition in China has been the result of undernourishment rather than overeating. In terms of nutritional deficiency, there have been three causes. First, in times of economic deprivation, malnutrition resulted largely from an inadequacy of total caloric intake. China's food situation has improved over time to compare favourably with consumption levels in low-income countries. In general the Chinese are now getting enough calories to meet energy requirements. Second, protein deficiency has usually been linked to the eating of large quantities of the wrong food. In fact, most of China's nutrition problems still stem from overconcentration on grain. Some major micronutrient deficiency diseases due to the absence of a certain mineral or vitamin from the diet remain to be controlled and prevented. Obesity, malnutrition in terms of nutritional excess, represents a fairly recent phenomenon among the country's city dwellers, especially children.

The Composition of Chinese Diet

As early as between the 4th and the 1st century B.C., the consumption of meat in China had to be greatly reduced as humans and cattle were vying for the shrinking land. At the same time, pork and dog meat was largely substituted for beef and mutton. (1) Today pork consumption comprises some 90% of China's red meat consumption. (2) Since those early times, grains and vegetables have constituted the largest and second largest component of the Chinese diet respectively. While the former provide the bulk of calories, the main contribution of the latter is in their vitamin and mineral value.

Table 1 summarizes China's present-day diet composition in comparative international perspective. In 1980, for example, per capita consumption of grain in China was more than twice that in Northern America or Western Europe and 50% higher than in Japan. The intake of vegetables exceeded annual average

per capita consumption in the United States and Japan. In the late 1970s, a daily intake of 411 grams per head at the national

Table 1: The composition of the diet in China, Japan, the United States and France, in 1980

Average annual per capita consumption (kg)							
Country	Grain	Veget- Fruit ables		Meat	Dairy Pro- ducts	Eggs	Aquatic Pro- ducts
China	196.5	150.0	6.8	9.5	1.0	2.2	48.5
Japan	119.6	111.3	43.0	17.9	53.9	14.0	34.9
USA	75.0	103.0	29.0	92.8	202.5	135.0	14.0
France	73.0	182.5	73.0	94.9	127.8	3.6	15.5

Source: Renkou yu jingji (Population and economies), no. 2, 25 April 1981, pp. 2-10; JPRS, 79882; CR, 259, p. 36, Table I.

level compared with averages of 600 grams in Beijing, 525 grams in Nanjing, 480 grams in Guangzhou and 400 grams in Shanghai. (3) On the other hand, dairy products have almost disappeared from the Chinese diet to occupy only a negligible fraction of total consumption in the Western world. Even the Japanese consume twice as much meat as the Chinese and fifty times as much in dairy products. In 1984, each Chinese resident consumed an average of 15.2 kg of meat per annum which was less than half of the world average. (4)

Considering the fact that for 1978 fishery output was reported as 5 kg per person per year (5) and that in 1979 China is said to have ranked 100th in the world in annual per capita consumption of aquatic products, (6) the figure provided in Table 1 appears to be unrealistically high and should actually be replaced by the production based estimate.

Quantitative Improvements in the Chinese Diet

The first requirement of any policy designed to feed a population is the provision of calories. Plants provide more than 90% of the food energy in all developing countries. It is only in the richest nations that this source contributes less than 75% in favour of meat, dairy and aquatic products. (7) The composition of Asian food is such that carbohydrates are the principal

source of calories. In China's southern provinces, rice is the staple food of over 70% of the people, while wheat and kaoliang are the staples in the north.(8) Therefore grain production must be expected to be a key indicator of energy availability. (9) How then has grain production met the caloric requirements over time?(10)

An insight may be gained into this aspect from food balance sheets compiled for the period 1950-81 by the World Bank which include all the nutritionally important items in the Chinese diet.(11) They show per capita nutrient availability to have been fairly low in the aftermath of the civil wars. As grain production picked up in the 1950s, total energy available per capita rose accordingly, and by 1958 China had reached a level close to 2,200 kilocalories, then considered to be the approximate daily requirement. However, the sharp drop in grain output during the 1959-62 period was reflected in extremely low total energy availability suggesting malnutrition (12) and starvation. In fact, the Chinese have officially admitted 'periods of starvation'.(13)

Although the situation has gradually improved, it was not until the late 1970s that the average consumption of calories in the Chinese diet became adequate. A document of the Central Committee of the Chinese Communist Party admitted that in 1977 the average per capita grain ration was still a little less than in 1957. (14) Likewise, Lardy believes that by 1978 average daily per capita food intake was below the 1957 level.(15) But the trend towards steady improvement has continued, and since the introduction of family farming in 1978 total energy availability has increased steeply. In 1982, China's level of energy availability exceeded those of the low-income countries and even surpassed those of the middle-income countries, as shown in Table 2.

It is clear that during the periods of political instability, i.e. the Great Leap Forward and the Cultural Revolution, malnutrition was a general feature in China. Although it seems safe to conclude that, on a national level, this situation has not recurred in the past fifteen years, severe malnutrition would probably still exist in certain localities of a country as vast as China were it not for a redistribution of food crops. In fact, the Chinese press does not deny that in the poorest areas people are still short of food.(16)

World Bank estimates for 1979/80 suggest a concentration of malnutrition in several southwestern and northwestern provinces and autonomous regions including Nei Mongol, Guizhou, Yunnan, Xizang, Shanxi, Shaanxi, Gansu, Qinghai and Ningxia as well as the three municipalities of Shanghai, Beijing and Tianjin.(17) It should, however, be noted that the calculated energy availability figures are based on production only and

Table 2: Per capita daily availability of energy in China and other countries, in 1982

Country	Calories	percentage of requirement
Low-income countries (average)	2,408	105
Kampuchea	1,792	81
Bangladesh	1,922	83
Vietnam	2,017	93
Nepal	2,018	86
India	2,047	93
Pakistan	2,277	99
Sri Lanka	2,393	107
Indonesia	2,393	111
China	2,562*	109
Middle-income countries (average)	2,661	114
Thailand	2,296	103
Philippines	2,393	106
Brazil	2,623	110
Malaysia	2,688	120
Hong Kong	2,774	121
Singapore	2,954	128
Mexico	2,976	128
Korea, Republic of	3,051	130
Industrial countries (average)	3,400	133

* According to an official Chinese source, per capita daily availability of energy was 2,779 calories in 1982 (Beijing Review, 22 October 1984, p.32).

Source: World Bank: World Development Report 1985, pp.220-221.

do not take into consideration interprovincial or international grain trade. Therefore, they are underestimates of the real caloric availability, in particular in the case of the three municipalities under the direct administration of the central government. But most of these areas with poor production conditions are claimed to have become self-sufficient in grain by 1983. (18)

The Chinese have not yet released a continuous time series on average daily energy availability. But even scanty data confirm a dramatic improvement between 1978 and 1982, when total caloric intake reportedly increased from 2,311 kcals to 2,666 kcals in 1981 (19) and to 2,779 kcals in 1982. (20) In 1981, the amount of food necessary every day for an average person

was considered to be 2,600 kcals. (21) Consequently, the Second National Diet Survey conducted in 1982 concluded that the caloric intake of a typical Chinese diet was sufficient for growth and productivity. (22) However, it is not unusual for official Chinese figures to be contradictory, and this is certainly the case when we are told that 'By the end of this century ... these figures will increase each person's daily caloric intake to 2,400 kilocalories...'. (23) Target diet figures appear to have been revised downwards, and only very recently dietitians recommended 2,400 kcals as part of a standard daily diet for adults. (24)

Qualitative Improvement in the Chinese Diet

Concern about nutrition is not new to China. In fact, the Chinese government has realized for a long time that the quality of the diet needs to be improved. But it is only now, with record grain harvests that China can afford to shift the focus away from agriculture to animal husbandry and aquaculture. Hu Yaobang, Chinese Communist Party General Secretary, recently said that 'It would be a great victory if the Chinese can turn their staple food from grain into meat and milk within a generation.' (25)

Indeed, the composition of the Chinese diet is in the process of changing in that the consumption of non-staples has been increasing. While this development was slow between 1951 and 1978, meat intake rose by approximately 50% during the 1978-1982/83 period. It was the long stagnation of quality food consumption that has prompted a rapid increase in demand in the past few years. In Liaoning annual meat consumption for peasants jumped from 7.25 kg in 1978 to 10.95 kg in 1982. (26) In Jilin, annual per capita pork consumption in the rural areas was 5.3 kg in 1952, rising to 6.8 kg in 1978, and to 11.0 kg in 1982. For the urban areas the figures were 8.9 kg, 10.3 kg and 17.85 kg respectively, (27) indicating the traditional urban-rural differential of at least 1.5 to 1.0.

According to a survey conducted by the State Statistical Bureau, the intake of meat, eggs and aquatic products rose by at least 40% during the 1980-84 period. (28) Due to higher average incomes, urban residents tend to consume more meat than their rural counterparts. Alone in the year 1979, pork consumption in the cities of Wuhan, Beijing and Tianjin rose by 6.25 kg, 5.35 kg and 5.0 kg respectively. (29) On a national level, pork consumption increased from 7.7 kg in 1978 to 11.1 kg in 1981, (30) and to 12.3 kg in 1983. (31) Especially in the cities, the workers are gradually tending towards high protein and low fat. (32) In Yunnan's urban areas, the 1984 consumption of aquatic products and eggs increased by more than 20% and that

of pork by around 10%. (33)

A comparison of the consumption patterns of Beijing's sub-urban peasants in 1978 and 1982 shows that while grain intake remained almost constant during the 4-year period, the consumption of non-staples has risen by leaps and bounds. (34) At a meeting on nutrition held in October 1983 in the capital, specialists recommended that Beijing residents readjust their diet further along these lines. Each person should reduce grain consumption to 150 kg per annum and increase the annual intake of meat, eggs and dairy products to 30.0 kg, 15.0 kg and 30.0 kg respectively. (35) Such a diet would be very similar to the structure of the diet in Japan but still differ greatly from the pattern obtaining in the Western world.

The consumer goods study group of the State Council's Technological and Economic Centre recently predicted major changes in the composition of the Chinese diet by the year 2000. Table 3 shows that, on the national level, intake of more protein-rich foods will substantially reduce the consumption of cereals. The Chinese people are now choosing lean pork, beef and mutton rather than fat meat. (36)

Table 3: Present and future food consumption in China per head, 1982 and 2000

Type of food (kg)	1982	2000
Grain	225.5	172.5
Meat	11.75	22.5
Dairy products	*	20.0
Eggs	2.5	10.0
Aquatic products	*	5.5
Vegetable oil	3.5	5.5
Sugar	4.4	6.0

* Figures are not available

Source: Beijing Review, 25 March 1985, p.29.

Moreover, twice the quantity of spirits and wines were supplied in 1983, compared with 1978. As peasants have become beer drinkers, the demand for beer has increased greatly. (37) There is now an emphasis on nutrition among the Chinese and a desire for a variety of foodstuffs. Even fresh milk has become an indispensable food item, especially for the babies of working women in cities. (38) The marked improvement in nutrition can be attributed to an expansion in production and an increase in incomes. Moreover, the relaxation by the State of

price controls in the spring of 1985 has boosted the availability of protein-rich foods, especially fresh and live food products, on the open market. (39)

According to World Bank calculations, the share of total energy supplied by animal sources has risen marginally from 3.63% in 1950 to 5.82% in 1981, with plants still supplying 94.18% of the average Chinese's calories. Since animal products are richer in proteins than plant matter, changes in total protein availability have been more pronounced. While protein coming from animal products is estimated to have accounted for 6.33% in 1950, it made up 9.7% in 1981. (40)

Moreover, an overall trend for energy and proteins derived from fine grains to grow at the expense of coarse grains has been reported in the official Chinese news media. (41) In 1978, per capita consumption of unprocessed grains was almost evenly divided between fine and coarse grains, accounting for 122.5 kg and 125.6 kg respectively. By 1981, intake of the former had risen to 163 kg, while that of the latter had dropped to 94 kg. (42) According to a survey conducted by the State Statistical Bureau, during the 1980-84 period the share of fine grain consumption rose from 63.4% to 78.4%. (43)

While starch and carbohydrate intakes are claimed to be adequate, (44) consumption levels of animal products are still low by international standards, as shown in Table 1. Meat and dairy products account for roughly one-third of the world's average per capita consumption. But interestingly enough, Chinese nutritionists are not keen on emulating the North American or Western European diets, which are higher in calories, animal proteins and fats, as they consider it as a possible cause for the high incidence of cardiovascular disease, high blood pressure, obesity and rectal cancer. Rather they suggest that China learn from the Japanese, who consume less meat, eggs and dairy products but more fish than the Americans. (45) Furthermore, a diet low in calories, fat and animal protein and high in fibre content and carbohydrates is thought to be largely responsible for China's centenarians' extended lives. (46)

China's Strategy of Improving the State of Nutrition

As discussed above, today China is capable of satisfying a human body's caloric requirements, i.e. some 180 kg of processed grain annually per capita. This means that the problem of getting enough to eat has been solved. In other words, the minimum amount of calories physiologically required is no longer used as the standard for evaluating nutrition, but rather the structure of the diet is being studied. Therefore, since 1978 efforts have shifted to the production of protein. (47)

China's high carbohydrate diet is deficient in proteins, as

revealed by a study undertaken by the Economics Institute of the Chinese Academy of Social Sciences the findings of which are summarized in Table 4.

Table 4: Ratios of plant- and animal provided protein as a percentage of total protein needs for China, Japan, the USA and France, in 1980

Country	Plant protein ratio	Percentage of total intake	Animal protein ratio	Percentage of total intake	Combined protein ratio
China	0.5776	88	0.0813	12	0.6589
Japan	0.3419	50	0.3370	50	0.6789
France	0.2858	27	0.7653	73	1.0511
USA	0.2559	24	0.8266	76	1.0825

* The ratio is based on the average world level of a daily per capita protein need of about 85 grams in 1980.

Source: Renkou yu jingji (Population and economies), no. 2, 25 April 1981, pp.2-10; JPRS, 79882; CR, 259, p.37, Table II.

Both in China and in Japan the total amount of protein provided does not meet body needs as measured by the average world level of a daily per capity protein requirement of about 85 grams. By contrast, France and the United States have an over-supply of protein. But although both, China and Japan, have a poor supply, the Japanese diet level is superior to China's due to its substantially higher animal protein ratio. While Japan has achieved a balance between plant- and animal provided protein, in China almost 90% of total protein intake still comes from plant matter.

Nevertheless, plants are to continue to provide the main part of the Chinese diet to carry forward the longstanding tradition of eating higher amounts of plant protein. (48) Unlike in the developed countries, nutrition is to be improved through vegetable protein development without neglecting animal protein production. Given its huge population and limited land resources, China cannot afford to use a substantial part of its grain production as fodder for animals. Therefore, new vegetable protein resources have to be developed and the utilization rate of protein has to be increased.

There appears to be some potential for increasing the protein content of China's cereals. Of all the grains wheat has the third highest protein content after soybeans and pulses. (49)

Yet Chinese wheat is low in protein - 13% in the north and only 10-12% in the Yangtze valley - compared with the varieties grown in the United States and Canada with 15% and a new experimental British strain with even 25%.

Although generally the protein content of vegetables is very low, there are few exceptions, such as fresh mushrooms. As mushroom raising requires limited investment in return for rapid economic returns, many areas in China have begun to grow them, and even urban air-raid shelters are used for breeding.

Hilly areas, ponds and beaches are used to grow crops and fruits of high protein content, such as nuts, olives and seaweeds. Soybeans, which originate in China, have a high nutritional value of about 40% protein. Although the per hectare output is one ton only, one hectare of soybeans can satisfy a person's protein needs for 2,224 days, about two-and-a-half times longer than one hectare of wheat. Therefore, the Chinese currently encourage the enlargement of the soybean growing area at the expense of crops of lower nutritional value.

Great efforts are made to fortify food by adding amino acids, building blocks of protein, such as lysine and methionine. For example, the addition of lysine to grains was shown to have improved children's weight, height and health. (50) Methionine is known to increase the nutritive value of soybean protein. China now produces a small quantity of edible lysine and methionine for human consumption.

A highly nutritious black rice has been developed in Guangxi Autonomous Region containing 83% more lysine than white rice. (51)

Protein Deficiency

The Chinese diet has traditionally stressed vegetable dishes. For reasons stated above, no drastic changes can be expected in this respect in the foreseeable future. This is problematic because plant matter contains less protein than animal products. As shown above, China's consumption pattern suggests protein deficiency. Take meat, for example, which is outstanding as a protein source. Considering the fact that 100 grams of cooked meat provides 45% of the protein needed, (52) average annual meat intake in China of 9,5 kg in 1980 would have supplied only 10% of the requirements. Consumption levels of dairy products and eggs were even lower. By contrast, in the United States and France, protein derived from meat alone exceeded total body needs. (53)

In addition, anthropometric data are a useful indicator of the prevalence of malnutrition, because protein deficiency tends to result in low height for age, or stunted growth, of

children, to mention one of its manifestations. (54) A survey of nine cities (Harbin, Beijing and Xi'an in northern China; Shanghai, Nanjing and Wuhan in central China; Guangzhou, Fuzhou and Kunming in southern China) conducted by the Ministry of Public Health in August–November 1975 on 139,130 boys and 134,605 girls revealed stunting to be fairly prevalent. The results are summarized in Table 5 by urban districts and suburban rural areas. The prevalence of malnutrition by this definition was about four times greater in suburban rural than urban areas. As peasants in the suburbs of cities are probably better off than those in typical rural areas, they would not even be representative of the whole country. (55)

Table 5: Percentage of children stunted in the urban and suburban areas of nine Chinese cities, in 1975.

Age	Males			Females		
	Beijing Urban	National Urban	National Suburban	Beijing Urban	National Urban	National Suburban
3-3.5	1.7	4.4	21.8	0.3	4.4	24.2
5-5.5	1.3	5.9	21.5	1.4	3.8	24.5
7-8	1.1	4.4	26.1	1.9	5.8	26.8
9-10	1.2	4.5	23.0	4.8	6.9	33.0
11-12	8.4	10.6	37.1	6.2	13.1	43.6
13-14	16.1	22.7	50.0	4.8	11.1	34.8
15-16	10.6	14.9	39.0	3.0	4.0	10.0
17-18	4.1	7.6	23.6	2.0	2.7	7.5

Source: China: Socialist Economic Development, Vol. III, The social sectors, population, health, nutrition and education. The World Bank, Washington D.C., 1983, p.35, Table 2.7, based on estimates of children's weight for height calculated from data collected by the Ministry of Public Health in a 1975 survey of nine cities.

When the 1975 suburban data of Harbin, Shanghai, Wuhan and Guangzhou were compared with urban data in the same cities in 1952–55, there was only a negligible difference between the average values of height and weight. In other words, in the years between the two surveys, the rural nutritional status has improved and consequently the physical development of children in suburban areas has caught up with the old level of urban children. (56) However, since the nutritional

status in the cities has also risen during the period under discussion, the urban-rural gap has persisted, as shown in Table 5. The phenomenon of stunting is next to negligible in urban Beijing which conforms well to China's recent claim that Beijing residents are now getting nearly enough protein, based on a survey of 7,605 people.

In spite of indications of protein deficiency all the evidence available suggests that over time there has been an improvement in nutritional quality as measured by height for age of infants and children across China. A sample survey from the Children's Health Research Coordination Group in Yinchuan of Ningxia showed that children in northwestern China (Shaanxi, Gansu and Qinghai provinces and Ningxia and Xinjiang autonomous regions) are 10 cm taller than their parents. (57) According to the results of a survey carried out in 1979 on the physical development of children under the age of 14, Chinese children are an average of 2 cm taller than children 30 years ago. (58) All these figures basically conform to the common view held in China that the average growth of children increased by 1 cm every 10 years (59) which is the keeping with the secular trend.

It should be noted, however, that regional differences are considerable and that, while children of southern China have better physiques than those of the north, northern children are taller. These conclusions were summed up at a conference on children's physique held jointly by the State Sports Commission and the Ministries of Education and Public Health in October 1980. (60) Furthermore, the absence of severe manifestations of protein deficiency such as kwashiorkor and marasmus support the hypothesis of a qualitative improvement in the Chinese diet.

In some of the developing countries in Asia such as Nepal and Sri Lanka malnutrition was still viewed as a major health problem in the mid-1970s. (61) Therefore, it will be interesting to compare the extent of malnutrition, as measured by stunting, in China with that in those two Asian countries. Table 6 suggests a positive relationship between the percentage of children with low height for age and the prevalence malnutrition. Compared with Nepal and Sri Lanka, stunting among children in China's rural provinces including one of the country's poorest areas appears to be substantially lower. This finding would be consistent with the differences in nutritional status of the countries under consideration.

Table 6: Stunting among children in China in comparative Asian perspective, in 1975 and 1980

Location	Age (years)	Number	Stunted (%)
China (1975)			
9-city survey, urban	7	*	1.8
9-city survey, suburban	7	*	13.2
China (1980)			
Urban Beijing	6-8	136	0.0
Urban Gansu (Lanzhou)	6-8	29	10.3
Rural Gansu	6-8	219	29.2
Urban Jiangsu (Nanjing)	6-8	80	3.8
Rural Jiangsu	6-8	61	11.5
Nepal	5	1,202	55.4
Sri Lanka	5	2,183	46.2

* Figures are not available

Source: Jamison, Dean T./Trowbridge, F.L.: The nutritional status of children in China: A review of the anthropometric evidence. The World Bank, Washington, D.C., August 1983, p.31, Table 11.

In a similar vein, in Shanghai 6-months-old baby boys and girls are an average of 2.32 cm and 2.58 cm respectively taller than the world average height listed by the World Health Organization. (62)

Micronutrient Deficiencies

Shortages of certain foods containing one or more of the essential minerals or vitamins may lead to specific nutritional diseases. As in the case of protein deficiency, diet quality rather than quantity is the problem. Chinese researchers believe that trace elements contribute to longevity by preventing coronary disease and tumours. Interestingly enough, iron, selenium, cobalt and molybdenum are more concentrated in grain and soy products of those areas which have most of the nation's centenarians. (63) Anemia, Keshan disease and goitre appear to be China's three major deficiency diseases resulting from insufficient dietary intake of some specific minerals.

Irons deficiency (anemia) is widespread in China as it is in

many developing countries. A 1979 survey conducted by the Ministry of Public Health of children aged 1 month to 7 years in Beijing and Shanxi of North China found 47% moderately anemic and 2.4% severely anemic.(64) More than one-third of the country's young children are reported to be suffering from iron deficiency.(65)

Selenium deficiency (Keshan disease), a high-mortality disease of the heart muscles, common in northern China, was first discovered in Heilongjiang's Keshan County where it is severely endemic. Lack of molybdenum and magnesium have also been found to be causative. 1% of children under 10 years old are affected. Thanks to special health campaigns, the fatality rate (66) has been reduced from almost 80% to 13%. Some endemic areas of northern China are said to have had no acute cases for years. An effective preventive measure is to give people in incidence areas medicines containing those trace elements lacking in the drinking water and diet.(67)

Goitre is a very common nutritional deficiency disease throughout China caused by the absence of iodine in the diet. Since 1966, 16 provinces, municipalities and autonomous regions in the north of China have scored great achievement in preventing and controlling goitre. Over 10 million individuals have been cured and about 130 million people in various parts of the country have received injections of iodine tincture as a preventive measure. Products such as iodized salt, iodized oil and iodized malt have been successfully used in goitre prevention. The addition of iodine-rich water and food such as kelp to the diet have achieved the same preventive effect.(68) According to the latest report, this micronutrient deficiency has been virtually eliminated in fourteen provinces and municipalities, compared to one in 1980.(69)

Rickets, a disease of infancy and childhood, appears to be China's most widespread micronutrient deficiency. In the case of insufficient dietary intake of calcium or vitamin D the deposition in the bones of calcium phosphate does not proceed normally and the softened bones become curved and stunted. Chinese children only get half the calcium they need for normal growth (70) which is not surprising in view of the fact that consumption of dairy products, the major source of calcium, is very low in China.(71) A dietary survey of 392 students of Qibao middle school in a rural area near Shanghai revealed calcium intake to be only one-fourth of the recommended daily average of 1,200 milligrams. Their annual per capita consumption of milk products came to less than 1 kilogram.(72) A plenty of vitamin D is found in fish oils, the disorder is uncommon where fish is eaten in abundance which is generally not the case in China.(73) Vitamin D is also synthesized in the skin under the influence of sunlight so that rickets is most unlikely to be encountered in the tropics of southern China, while it has always been endemic

in the north of the country. A 1979 survey of over 70,000 children conducted by the Ministry of Public Health in ten provinces found a prevalence of rickets of 29%. Health officials hope to reduce the incidence of this disorder by 30-50% in the cities and 30% in the countryside. (74)

Pellagra, characterized by the so-called classical three D's - dermatitis, diarrhea and dementia, is due to niacin (vitamin B5) deficiency. It is seldom found where the population eats a well-balanced diet, but it occurs widely in China where the diet is high in starchy food and low in niacin and amino acids. Meat, milk and eggs will protect the body from pellagra. Therefore, Chinese nutritionists have been urging an expansion of animal husbandry in all areas where this disease is endemic. Its incidence has been drastically reduced in the heavily affected areas in South Xinjiang of Northwest China. (75)

Riboflavin (vitamin B2) deficiency was reported as one of the most widespread nutritional diseases in China in the 1950s. (76) But no mention has been made of it since which conforms with the fact that the consumption of riboflavin-rich foods such as meat and dairy products have been on the increase. (77)

One of the earliest signs of vitamin A deficiency is night blindness cases of which were reported from various parts of the country in the 1950s. (78) The disorder appears to have been brought under control as the intake of leafy vegetables, which contain carotene that is converted to vitamin A in the body, is now generally adequate in China.

In Far Eastern countries where polished white rice is a dietary staple, beriberi is due to the loss of thiamin (vitamin B1) in the course of processing the grain. In old China, beriberi was a commonly seen deficiency disease in people living in the rice-producing regions of the country. But after 1949, its incidence decreased because new standards for regulating the process of husking and polishing rice have increased its nutritive value. Moreover, improved living standards have allowed a more varied diet. By the late 1950's, beriberi had become a rarely seen disease. (79) However, with the growing acceptance in China of 'junk food' which is lacking thiamin it is feared the disease may be making a comeback. (80)

Obesity

While in the United States and Europe obesity is perhaps the most important nutritional disease, usually resulting from excessive caloric intake, until recently it used to be an extremely rare dietary problem in China. But now Chinese nutritionists are becoming increasingly concerned about overeating

among the country's city dwellers. They have developed a rough formula which allows them to determine whether someone has a weight problem. A person's weight in kilograms should not exceed his height in centimeters minus 105. Some 36% of Beijing adults surveyed were found to be more than 5% above the standard weight. The major reasons given for this malnutrition of affluence are the improving economic situation, improper diet and lack of exercise. While a proper diet should only contain 17-20% of the total calories in fat, the average Beijing resident derives more than 20% of his energy from fat. (81)

Chinese pediatricians are worried by the fact that more and more children are becoming overweight. According to a survey conducted by the Tiyubao (Sports News), one in sixty is overweight with most of the patients being only children. Needless to say, more often than not these children are treated with high fat and calorie food. (82) Another survey on 3,000 pupils in eight Beijing primary schools revealed that 2-3% of the children were 20% above the standard weight for their their age group. (83) In a similar vein, a recent medical examination of 900 of the city's pre-school children found some 36% to be more than 5% over their normal weight. (84)

As Chinese medical circles are aware that obesity predisposes toward several serious disorders including high blood pressure and arteritherosclerosis, they are determined to control it. Weight-loss exercise classes have sprung up and diet medicines are being produced. This new trend towards obesity in the urban areas has even created a demand for specially designed clothing for overweight people. (85)

Problems and Prospects for the Future

The size of the population determines to a great extent the food requirements, which in turn determine the diet structure, or nutritional status of the population. As discussed above, the present diet level in China which supports more than one billion people is poor in terms of animal provided protein. Given the country's present natural resources and output levels the potential to increase the animal protein sources is fairly limited. A few years ago, a Chinese population research group carried out a study on future levels of nutrition in relation to size of population the findings of which are summarized in Table 7.

Table 7: Relationship between nutritional status and size of Chinese population at present and in selected future years

Ratio of Animal Protein	Maximum population (million)				
	1980	2000	2030	2050	2080
0.1	400				
0.2	385	539			
0.3 *	371	526			
0.4		513	720		
0.5			703	785	
0.6			687	768	
0.7 **				738	806
0.8 ***					743
0.9					686

* Approximate present level for Japan.

** Approximate present level for France.

*** Approximate present level for the United States.

Source: Renkou yu jingji (Population and economies) no.2, 25 April 1981, pp.2-10; JPRS, 79882; CR, 259, p. 38, Table III.

As expected, the smaller the size of the population, the higher its nutritional status and vice versa. For example, a ratio of 0.3419 of animal protein currently enjoyed by the Japanese could barely support 370 million people in China. But productivity in the sector of animal husbandry is expected to improve over time as an increasing proportion of total grain production is set aside for fodder, and by the year 2000 the same nutritional level has been calculated to support 526 million Chinese. In the more distant future, i.e. in the year 2050, a population of 738 million is estimated to attain the present nutritional level for France. In other words, if China were to succeed in limiting her population to this size by the middle of next century, then the Chinese could enjoy the modern dietary level, whereby the total amount of protein supplied meets the body's nutritional requirements. This would permit everybody to eat both to the full and well.

The concept of the most 'suitable' population size is of major strategic importance to the future development of China. To the Chinese researcher in this field 'suitable' means that the growth of population should coincide with the growth of land resources and economic development, and an analysis of China's future diet structure has been based on these factors. According to the findings, in 100 years from now the country's most suitable population would be 650-700 million provided

agriculture and animal husbandry grow three-and-a-half times larger. These conditions are estimated to guarantee daily requirements of 85 grams of protein. While a larger population would reduce the nutritional status, more drastic measures to limit the population even further would surely be rejected by the Chinese people. (86)

The same research group has also worked out China's future diet structure. As shown in Table 8, the projected development tends towards a diet of high animal protein content. Grain consumption is still expected to rise during the remainder of this century, but only less than half will be consumed in about 100 years from now. By 2050, China should have attained present Japanese grain consumption levels and by 2080 the country should be approaching the substantially lower levels currently obtaining in the United States and France. By the turn of the century, the intake of meat and dairy products in China are expected to have surpassed current levels in Japan, and in about 100 years from now it will be approaching current levels in the Western world. The ratio of animal provided protein is to increase over time.

Table 8: China's diet structure at present and in selected future years commensurate with Table 7

Year	Anim. Prot. Ratio	Average annual per capita consumption (kg)						
		Grain	Veg.	Fruit	Meat	Dairy Pro- ducts	Eggs	Aqua- tic Prod.
1980	0.1	196.5	150	6.8	9.5	1	2.2	5.0
2000	0.3 *	247.3	150	31.4	33.3	60	4.5	9.1
2030	0.5	168.3	150	52.3	60.5	100	7.5	8.1
2050	0.6	128.8	150	62.8	73.7	120	9.0	8.3
2080	0.7 **	88.6	150	73.3	86.5	140	10.5	9.0

* Approximate present level for Japan.

** Approximate present level for France.

Source: For 1980 consumption levels, see Table 1. Future consumption levels have been derived from Renkou yu jingji (Population and economies), no.2, 25 Apr. 1981, pp.2-10; JPRS, 79882; CR, 259, p.38, Table IV.

On the basis of these projections, by the year 2000 China's diet structure should be very similar to the present pattern in Japan, and by 2080 modern dietary levels should be obtaining

in China. At that stage, total protein availability would exceed body needs with animal sources supplying about three-quarters of total protein intake. As shown in Tables 7 and 8, not only will dietary levels improve, but at the same time a larger maximum population can be supported.

Finally, the Chinese population researchers have attempted to establish the future relationship between dietary levels and the total fertility rate.(87) In a nutshell, according to their projections, the lower the total fertility rate, or the smaller the size of the individual family, the sooner will the nutritional status of the Chinese population improve. A situation of one birth per childbearing woman - the first option considered in Table 9 - seems highly unrealistic. China was never meant to become a country of singly children only, because the Chinese leadership regards the one-child family as a temporary emergency measure rather than a permanent solution.(88) The total fertility rates achieved in 1980 and 1981 accounted for 2.24 and 2.63 children per married couple respectively.(89) The State Family Planning Commission, set up in March 1981, intends to reduce this rate to 1.5 by 1990 and maintain it at the same level until the year 2000 (90) implying that 50% of all married couples are to have one child only. If the one-child campaign, launched in 1979, proves to be successful during its initial 30-40 years, then it is intended to raise fertility rates to allow an aggregate birth rate of 2.16 per childbearing woman.(91)

Table 9: Relationship between China's nutritional status and total fertility rate

Total fertility rate	Period of continued poor nutrit. status	Approximate time for ratio of animal protein to attain below levels					
		0.2	0.4	0.6	0.7	0.8	0.9
1.0	about 2040	2045	2048	2051	2053	2056	2059
1.5	about 2060	2067	2070	2074	2078	2080	
2.0	after 2080						

Source: Renkou yu jingji (Population and economics), no.2, 25 April 1981, pp.2-10; JPRS, 79882; CR, 259, p.40, Table V.

Therefore, even if Chinese women averaged only 1.5 births - the second option considered in Table 9 - the current American

diet structure would not be attained until about 100 years from now. If they average two births, as stipulated by the State Family Planning Commission, the Chinese people will face another 100 years of poor nutritional status and hence be unlikely to achieve modern dietary levels during the remainder of the next century.

Conclusion

A shortage of nutritionists and a lack of general knowledge of nutrition are currently exacerbating China's nutritional problems. It needs to be remembered that during the Cultural Revolution the science of nutrition was deemed as a study for the benefit of the bourgeoisie. Research on nutrition has not been fully revived since. Only in 1982, after an interval of 23 years, did the country conduct its second national nutrition survey. (92)

Nevertheless China has come a long way to attain a nutritional status where caloric deficiency has been eliminated and chronic nationwide malnutrition become a thing of the past. It would be beyond the scope of this article to elaborate on the various indicators supporting the hypothesis of improved nutrition. Suffice it to briefly note the major reflections of this remarkable achievement.

Malnutrition used to significantly contribute to the incidence and severity of China's health problems. In the past, poor maternal diets constituted one of the risk factors of premature births and low birth weight babies. There is evidence to suggest that their incidence has dropped significantly. (93) In a similar vein, the weight of the full-term born infant is reported to have risen. (94) Innumerable surveys, both at national and local levels, on the physical development of Chinese children and teenagers have invariably shown increases in the major physiologic indices including body height, weight and chest circumference which is obviously due to quantitative and qualitative improvements in nutrition. Since food requirements are partially determined by these anthropometric data, this development will in turn increase dietary needs currently representing an additional 0.15% per annum and estimated to amount to an extra 0.25% yearly by the turn of the century. (95)

The Chinese government regards proper nutrition as an important element in its policy of preventive medicine. The reduction of malnutrition has increased resistance to infections as a result of which there have been lower morbidity and mortality rates, especially for infants and children. (96) This aspect is extremely important as in the developing world even mild malnutrition is known to be one of the underlying causes of a great proportion of deaths due to infectious and parasitic

diseases. Finally, the most obvious link between nutrition and population is that wellnourished people live longer. In fact, in his address to the First International Conference on Nutrition held in Tianjin in 1981, China's Minister of Health, Dr. Qian Xinzhong, emphasized that better nutrition had increased the average life span of the Chinese from 36 years in 1949 to 68 in 1980. (97)

China's diet remains typically oriental, i.e. predominantly vegetarian and thus low in protein and certain minerals and vitamins. Therefore, the prevalence of mild to moderate malnutrition, especially among infants and children, is still alarmingly frequent in many parts of the country although the cause seems to be inappropriate weaning practices, improper nutrition and infections rather than lack of food. Micronutrient deficiencies cannot be prevented until China attains a more balanced diet in terms of protein sources. But given the limited natural resources and the huge population the country still has to go a long way to achieve a healthier diet. Compounding the problem is the current annual increase of 1.2% in per capita food intake resulting from population growth. (98) Both the magnitude of output increases in agriculture and animal husbandry and the rate of population growth are bound to be the crucial factors governing a further improvement of the nutritional status of the Chinese people.

Footnotes

- 1) Whyte, R.O.: Rural nutrition in China. Hong Kong, 1972, p.25.
- 2) Piazza, Alan: Trends in food and nutrient availability in China, 1950-81. Washington, 1983 (= World Bank Staff Working Paper No.607), p.90.
- 3) Skinner, G. William: Vegetable supply and marketing in Chinese cities, in: The China Quarterly (CQ), No.76, December 1978, p.745-746.
- 4) Beijing Review (BR), 26 August 1985, p.28.
- 5) *ibid.*, 27 April 1979, p.8.
- 6) Xinhua (in Chinese), 27 March 1979, BBC Summary of World Broadcasts Far East (SWB), FE/W1030/A/2.
- 7) Smil, Vaclav: Food availability in communist China: 1957 and 1974, in: Issues and Studies (IS), May 1977, p.41, footnote 10.
- 8) Whyte, *op.cit.*, p.34.
- 9) The Chinese definition of "grain" includes any staple foodstuff (primary source of calories): rice and wheat (fine grains); corn, millet and kaoliang (coarse grains); sweet and white potatoes, yams and cassava (tubers); peas and beans (pulses); and at times soybeans.

- 10) Note that the energy-producing content of food is usually given in kilocalories, and through loose usage the prefix kilo is often omitted. It may also be expressed in joules with 1 cal being equal to 4.1868 J.
- 11) Piazza, *op. cit.*, p.9.
- 12) "Malnutrition" in this context is used in the quantitative sense of a diet that is inadequate in calories.
- 13) BR, 20 January 1986, p.16.
- 14) Central Committee of the Chinese Communist Party: *Chung-fa* (1979), No.4, in: IS, July 1979, pp.105-106.
- 15) Lardy, Nicholas R.: Consumption and living standards in China, 1978-83, in: CQ, No.100, December 1984, p.850.
- 16) BR, 24 March 1986, p.35.
- 17) Piazza, *op. cit.*, p.42.
- 18) BR, 20 January 1986, p.17.
- 19) *ibid.*, 7 June 1982, p.7.
- 20) *ibid.*, 22 October 1984, p.32.
- 21) *ibid.*, 7 June 1982, p.7.
- 22) *ibid.*, 28 October 1985, p.28.
- 23) *ibid.*, 7 May 1984, p.31.
- 24) China Daily (CD), 7 January 1986, p.3.
- 25) BR, 7 January 1985, p.9.
- 26) Shenyang, Liaoning provincial service, 22 September 1983, SWB, FE/W1257/A/2-3.
- 27) Changchun, Jilin provincial service, 13 August 1984, SWB, FE/W1302/A/4.
- 28) CD, 28 September 1985, p.1.
- 29) Xinhua, in English, 25 July 1980, SWB, FE/W1096/A/2.
- 30) BR, 7 June 1982, p.7.
- 31) Xinhua, in English, 21 August 1984, SWB, FE/W1303/A/2.
- 32) CD, 22 January 1986, p.3.
- 33) Kunming, Yunnan provincial service, 12 December 1984, SWB, FE/W1319/A/3.
- 34) Xinhua, in English, 19 July 1983, SWB, FE/W1246/A/1.
- 35) *ibid.*, 16 November 1983, SWB, FE/W1263/A/1-2.
- 36) *ibid.*, 21 August 1984, SWB, FE/W1303/A/2; Kunming, Yunnan provincial service, 12 December 1984, SWB, FE/W1319/A/3; BR, 26 August 1985, p.29.
- 37) Xinhua, in English, 21 August 1984, SWB, FE/W1303/A/2.
- 38) Tianjin city service, 4 September 1984, SWB, FE/W1305/A/3.
- 39) CD, 4 November 1985, p.2; *ibid.*, 6 January 1986, p.3.
- 40) Piazza, *op. cit.*, pp.17-18.
- 41) Shenyang, Liaoning provincial service, 22 September 1983, SWB, FE/W1257/A/2-3; Jinan, Shandong provincial service, 1 September 1984, SWB, FE/W1305/A/2.
- 42) BR, 26 April 1982, p.17.
- 43) CD, 28 September 1985, p.1.
- 44) BR, 13 May 1985, p.27.
- 45) *ibid.*, 28 October 1985, p.28. For a comparison of consump-

- tion patterns, see Table 1.
- 46) *ibid.*, 2 December 1985, p.29.
 - 47) Proteins are required in children for tissue building and in adults for tissue repair. One of the principal reasons for the occurrence of protein deficiency is excessive dependence upon starchy foodstuffs derived from cereals and root staples.
 - 48) BR, 28 October 1985, p.28.
 - 49) Piazza, *op. cit.*, p.7, Table 1.1. The information that follows on China's efforts to develop protein resources was taken from BR, 25 October 1982, pp.21-23.
 - 50) Lysine and methionine are found in many common proteins but present in small amounts or lacking in certain plant proteins.
 - 51) CD, 9 August 1985, p.3.
 - 52) Encyclopaedia Britannica (EB), 15th ed., 1983, Macropaedica, Vol. 11, p.746.
 - 53) For a comparison of China's consumption pattern with those in the United States and France, see Table 1.
 - 54) A child is defined as stunted if his height is less than 90% of the median height for children of that age based on the standards of the United States National Centre of Health Statistics (China: Socialist economic development, Vol. III, The social sectors, population, health, nutrition and education. The World Bank, Washington, D.C., 1983, p.35, Table 2.7, note (i)).
 - 55) Chinese Medical Journal (CMJ), Vol. 3, No. 6, November 1977, pp.364-370.
 - 56) *ibid.*
 - 57) Xinhua, in English, 16 September 1985, SWB, FE/W1357/A/3.
 - 58) *ibid.*, 1 June 1980; Joint Publications Research Service (JPRS), 75878; China Report (CR), 91, p.82.
 - 59) *ibid.*, 24 April 1985; JPRS, 85-044, p.28.
 - 60) *ibid.*, in English, 1 November 1980. SWB, FE/W1108/A/1.
 - 61) Ruzika, Lado T.: Mortality transition in Asia: Technology confronts poverty, paper delivered at the forth national conference of the Asian Studies Association of Australia, Melbourne, May 1982, p.22, Table 2.
 - 62) Xinhua, in English, 9 June 1985, SWB, FE/W1343/A/1.
 - 63) BR, 2 December 1985, p.29.
 - 64) China: Socialist Economic Development, *op. cit.*, p.38, Table 2.8.
 - 65) CD, 12 December 1985, p.1.
 - 66) The "fatality rate" or "case fatality" measures the proportion of persons contracting a disease who die of that disease.
 - 67) Xinhua, in English, 21 April 1978, SWB, FE/W/980/A/1; BR, 6 July 1981, p.4; China: Socialist Economic Development,

- op. cit., p.38, Table 3.8; Xinhua, in English, 19 May 1985, SWB, FE/W1340/A/1.
- 68) Renmin Baojian (People's Health), Vol. 1, No. 10, 1 October 1959, JPRS, 2968, p.10; BR, 10 February 1978, pp.30-31; Xinhua, in Chinese, 19 July 1976, SWB, FE/W888/A/1; BR, 6 July 1981, p.4., China: Socialist Economic Development, op. cit., p.38, Table 2.8.
- 69) CD, 27 January 1986, p.3.
- 70) *ibid.*, 8 January 1986, p.1.
- 71) For current consumption of dairy products in China, see Table 1.
- 72) American Journal of Public Health, Vol. 72, No. 9, September 1982, Supplement, p.43, Tables 1,2.
- 73) For current fish consumption in China, see discussion on p.28 of this paper.
- 74) China: Socialist Economic Development, op. cit., p.38, Table 2.8; BR, 19 August 1985, p.9.
- 75) CMJ, Vol. 93, No. 11, November 1980, pp.785-788; BR, 6 July 1981, p.4; CMJ, Vol. 94, No. 9, September 1981, p.616. Note that 100 grams of cooked meat provides 26% of the needed niacin. Milk and eggs, although low in niacin, contain tryptophan for the body synthesis of niacin (EB, Macro-paedia, Vol. 11, p.746).
- 76) Renmin Baojian, JPRS, 2968, p.20.
- 77) Note that 100 grams of cooked meat provides 15% of the needed riboflavin (EB, Macro-paedia, Vol. 11, p.746).
- 78) CQ, No.6, April-June 1961, pp.68-69.
- 79) Renmin Baojian, JPRS, 2968, p.18. Note that 100 grams of cooked meat provides 31% of the needed thiamin (EB, Macro-paedia, Vol. 11, p.756).
- 80) CD, 5 November 1985, p.4.
- 81) BR, 4 March 1985, p.30.
- 82) *ibid.*, 4 March 1985, p.30; *ibid.*, 3 February 1986, p.10.
- 83) Xinhua, in English, 16 November 1983, SWB, FE/W1263/A/1-2.
- 84) BR, 4 March 1985, p.30.
- 85) *ibid.*
- 86) *ibid.*, 11 January 1982, p.25.
- 87) "Total fertility rate", or "aggregate birth rate" denotes the mean number of live births per woman over her lifetime. Note that "fertility rate" as opposed to "total fertility rate" denotes the number of live births in any given year per 1,000 childbearing women.
- 88) For a discussion of the one-child concept, see: Platte, Erika: China's fertility transition: the one-child campaign, in: Pacific Affairs, Vol.57, No.4, Winter 1984-85, pp.646-671.
- 89) CMJ, No.5, May 1983, p.366; JPRS, 84176; CR, 450, p.20.
- 90) BR, 24 October 1983, p.7.

- 91) *ibid.*, 11 January 1982, p.25.
- 92) CD, 18 December 1985, p.3.
- 93) For a drop in the incidence of premature births and low birth weight babies, see Platte, Erika: Mortality transition in the developing world: the case of China, paper delivered at the sixth New Zealand International conference on Asian Studies. Wellington, August 1985, pp.9-11.
- 94) CMJ, Vol. 1, No. 1, January 1975, p.74.
- 95) China: Socialist Economic Development, *op. cit.*, p.39.
- 96) For a decline in morbidity and mortality rates, see Platte, Mortality transition ... , *op. cit.*, tables in appendix.
- 97) CMJ, Vo. 94, No. 9, September 1981, p.616.
- 98) China: Socialist Economic Development, p.39.

Summary

This article examines two complimentary aspects in order to obtain a complete picture of the nutritional status of China's population. They are not mutually exclusive and both indicate the extent of malnutrition. The first aspect refers to food availability and consumption including the structure of the diet, while the second one deals with the manifestations of malnutrition.

As in the remainder of the developing world, malnutrition in China has been the result of undernourishment rather than overeating. In terms of nutritional deficiency, there have been three causes. First, in times of economic deprivation, malnutrition resulted largely from an inadequacy of total caloric intake. China's food situation has improved over time to compare favourably with consumption levels in low-income countries. In general the Chinese are now getting enough calories to meet energy requirements. Second, protein deficiency has usually been linked to the eating of large quantities of the wrong foods. In fact, most of China's nutrition problems still stem from overconcentration on grain. Some major micronutrient deficiency diseases due to the absence of a certain mineral or vitamin from the diet remain to be controlled and prevented. Obesity, malnutrition in terms of nutritional excess, represents a fairly recent phenomenon among the country's city dwellers, especially children.