

Dietary transition in China and its health consequences

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The pattern of food consumption in China has been subject to significant changes during the last 30–40 years, although the average dietary pattern is still based on plant foods. These changes have been characterized by increased consumption of animal products and decreased consumption of cereal products. These trends are supported by both national food disappearance records and by household survey data on the intake of specific foods. Changes in urban areas have been much more substantial than in rural areas. Preliminary findings show that the dietary transition is associated with a simultaneous decrease in the prevalence of acute communicable diseases and an increase in the prevalence of the major chronic degenerative diseases, such as cancers and cardiovascular diseases.

Introduction

The human species is known to have subsisted for thousands of years on a diet high in plant foods and low in animal products. It is only in the last 200 years that many industrialized countries, along with economic development, have changed their diet to one rich in animal products, fat and sugar. It has been widely recognized that the emergence of chronic degenerative diseases in the developed world is significantly associated with changes in the dietary pattern. In the developing world, while some countries remain concerned with the problems of hunger, malnutrition and communicable diseases; in other countries (including China), there have been considerable changes in the national diets, leading to the 'westernization' of the dietary pattern, characterized by a decreased intake of plant foods and an increased intake of animal foods. This paper will describe the dietary changes which have occurred in China in recent years as well as the corresponding changes in disease patterns.

Recent dietary transition in China

The pattern of food consumption in China has been subject to significant changes in the last 30–40 years. According to the national statistics of food provision¹, consumption of animal foods increased significantly from 1977–1987 (Table 1) and the same trend continues. Tables 2 and 3 show the changes in food and nutrient consumption in 12 provinces in China from 1982–1990, based on a household dietary survey². The data

Table 1. Food Consumption in China, 1978–87 (kg/capita/year). Source: State Statistic Bureau, China¹.

Year	Cereals	Edible oil	Meat	Eggs	Milk	Fish	Fruits	Vegetables	Sugar
1978	195.46	1.60	8.86	1.97	1.00	3.50	6.60	–	3.42
1979	207.03	1.96	11.05	2.00	1.33	3.22	7.04	75.0	3.56
1980	213.81	2.30	12.79	2.27	1.50	3.41	6.74	–	3.03
1981	219.18	2.94	12.77	2.44	1.55	3.57	7.60	129.7	4.10
1982	225.46	3.54	12.81	2.53	1.90	3.85	7.39	137.6	4.42
1983	232.23	4.03	14.64	2.96	2.15	4.02	9.04	139.0	4.47
1984	251.34	4.70	15.62	3.91	2.38	4.36	9.31	142.9	4.88
1985	254.35	5.13	16.90	4.90	2.80	4.89	10.00	135.9	5.63
1986	255.94	5.24	17.47	5.27	3.00	5.40	12.40	139.9	6.12
1987	251.44	5.66	17.69	5.56	3.40	5.54	15.20	135.9	6.66

Table 2. Changes in food consumption by Chinese people in 12 provinces (g/person/day).

	1982 ^a	1990 ^b	Difference	±%
Cereal	51.76	461.4	– 56.2	– 10.9
Legumes, nuts	15.1	39.5	+ 24.4	+161.6
Potatoes	201.4	101.0	–100.4	– 49.9
Meats	27.0	48.0	+ 21.9	+ 81.1
Eggs	5.7	17.1	+ 11.4	+200.0
Milk	2.6	11.0	+ 8.4	+323.1
Fish	11.6	22.9	+ 11.3	– 97.4
Vegetables	342.7	323.9	– 18.8	– 5.5
Fruits	29.3	101.2	+ 71.9	+245.4
Sugar	4.4	3.4	– 1.0	– 22.7
Alcohol	3.8	14.0	+ 10.2	+268.4
Vegetable oil	11.6	22.4	+ 10.8	+ 93.1
Lard	4.5	5.8	+ 1.3	+ 28.9
Salt	15.3	13.9	– 1.4	– 9.2

^a National nutrition survey. ^b Total diet study.

clearly show significant increases in meat, poultry, egg, fish and oil consumption as well as a slight decrease in cereal consumption (the traditional staple food in the Chinese diet). By the late 1980s, the average dietary energy intake in China had reached 2500 kcal per capita, suggesting the problem of food provision had basically been solved.

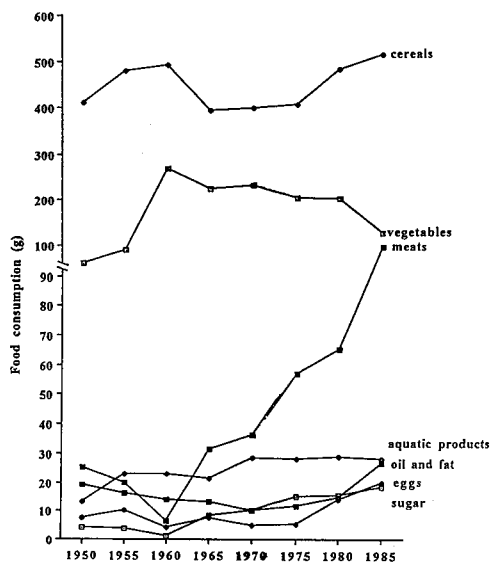
The changes are more profound in the urban areas. The national average fat intake in the urban population in 1988 reached 29.5 % of the total energy intake, which is very close to the upper limit of the WHO goal of 30 %¹. Figure 1 shows that during the last 40 years, the consumption of animal food, oil and fat, and sugar consumption in Shanghai city rapidly increased³. According to a 1989 survey on urban elderly residents in Beijing, average egg consumption was approximately one egg per person per day (Zhao et al., unpublished data). Although lower than the consumption level of the

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Table 3. Changes in average macronutrient intake of Chinese people in 12 provinces.

	1982 ^a	1990 ^b	Difference (%)
Energy (kcal)	2498	2203	-11.8
Animal products (%)	5.4	14.0	+159.3
Plant products (%)	94.0	84.9	-9.7
Alcohol (%)	0.6	1.1	+83.3
Protein (g)	66.0	64.0	-3.0
Animal products (%)	8.1	21.8	+169.1
Legume products (%)	9.0	8.3	-7.8
Total plant products (%)	82.9	69.9	-15.7
% total energy intake	10.5	11.6	+10.5
Fat (g)	44.1	51.2	+16.1
Animal products (%)	36.3	53.0	+46.0
Plant products (%)	63.7	47.0	-26.2
% total energy intake	16.0	21.2	+32.5
Carbohydrate (g)	456	366	-19.7
% total energy intake	72.8	66.1	-9.2

^a National nutrition survey. ^b Total diet study.

Figure 1. Changes in food consumption (g/person/day) in Shanghai city, 1950–85³

western countries, it still contributes about 400 mg of cholesterol to the daily cholesterol intake. Even in the rural areas, a similar trend has been observed. Table 4 shows an increased consumption of various animal products and cooking oil in the 65 counties surveyed in six year intervals from 1983–89. The fat intake increased by 33 % along with a 12 % increase in plasma total cholesterol (from 127 mg/dl to 143 mg/dl).

Health consequences of dietary changes

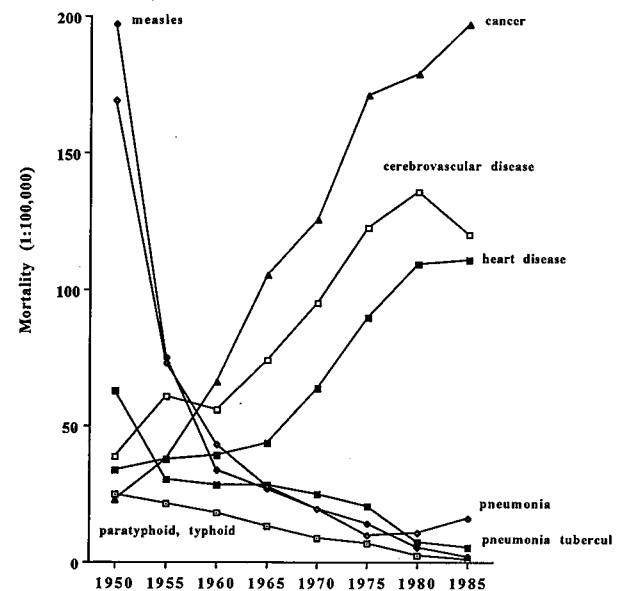
Several types of evidence are available for assessing the health consequences of the above dietary changes in the Chinese population. Health statistics data from Shanghai³, show that in the last four decades, there has been a sharp decrease in communicable diseases (eg, pneumonia, tuberculosis, measles, typhoid, etc.) and simultaneously, a significant increase in degenerative chronic diseases (eg, cancer, cerebrovascular disease, cardiovascular disease, etc.) (Fig 2).

Table 4. Changes in animal product and fat intake in 65 counties, 1983 vs 1989.

	g/adult male	
	1983	1989
Meat, poultry	26.4	34.0
Eggs	3.0	4.3
Fish ^a	17.0	27.0
Plant oil	9.9	17.6
Fat	44.2 (15.0%) ^b	53.3 (20.0%) ^b

^a Includes fish, shrimp, oysters, etc.

^b The contribution of fat to total energy intake.

Figure 2. Changes in disease mortality in Shanghai city, 1950–85³.

Bivariate correlational analysis showed significant positive correlations between meat and egg consumption and mortality from major chronic diseases in Shanghai from 1951–85 (Table 5)³. Similar correlations were obtained on the data from Beijing. Since the late 1980s, cancer and cerebro-cardiovascular diseases have become the two leading causes of death in most urban areas of China.

The huge geographical variations in both dietary patterns and disease prevalence in China (an enormous range of disease mortality exists in different areas across China) offered an unique opportunity to study the relationships between diet, nutrition and disease mortality. Our ecological data obtained from the 65 Chinese rural counties⁴ provided a sound database for this type of study. Campbell et al. (1992)⁵ divided the available disease mortality rates into two categories, ie, so-called diseases of poverty and diseases of affluence. Further statistical analysis showed that the diseases of poverty (mostly comprised of communicable diseases and perinatal diseases) were associated with poor diet and lower nutrition status, while diseases of affluence were associated with higher consumption of eggs, fish, beer and sugar, as well as 'better' nutritional status (indicated by levels of plasma urea nitrogen, albumin etc.) or 'over-nutrition' (indicated by plasma total cholesterol level).

By using the LISREL statistical procedure, an integrated statistical variable, general nutrition status (GNS), was created from five observable biological variables, ie, height,

Table 5. Correlation coefficients between food consumption and mortality rates of chronic diseases in Shanghai, 1951–85.

	Heart disease	Cerebrovascular disease	Cancer
Cereal	-0.2009	-0.4542	-0.6067
Vegetable	+0.0920	+0.1124	+0.1340
Meats	+0.9008	+0.8036	+0.7461
Eggs	+0.7892	+0.4996	+0.4929
Sugar	+0.9359	+0.8640	+0.7891

Note: all coefficients are significantly at $P < 0.001$, except cereal for heart disease and all three diseases for vegetable.

weight, whole blood hemoglobin, plasma urea nitrogen and plasma albumin, based on energy and protein status. Further statistical analysis showed that within the 65 counties, GNS was significantly positively correlated with mortality from all cancers, while it was significantly negatively correlated with the aggregated non-cancer causes of death (Table 6). Detailed analysis of individual diseases revealed that GNS was significantly positively correlated with most of the major cancers in China, as well as coronary heart disease and diabetes.

Discussion

The above information was collected from a number of different studies carried out in China. The findings indicate that the composition of the Chinese diet is undergoing significant changes towards more animal products, more cooking oils, more sugar and less cereals. Although the overall consumption of animal foods in China remains much less than that in western countries, the effects of significant amounts of ani-

Table 6. Correlation coefficients between GNS and mortality rates.

Causes of death	Male and female
All causes	-0.49
All cancers	+0.55
All non-cancers	-0.64

Note: all coefficients are significant at $P < 0.01$.

mal foods on the health of the population are already beginning to appear. Even in rural China, where animals food is only a minor part of the diet, the counties which consume more plant food and less animal food in their diet have been found to have less chronic diseases than the counties which consume less plant food and more animal food.

It is now critical for developing countries, such as China, to formulate proper national food, nutrition, health and agri-

cultural policies as well as health policies. In affluent countries, most of the policies that govern food production and supply were formulated in the 1940s and were geared to the prevention of deficiency diseases and were not designed to protect populations from diseases linked to dietary excess. Therefore, today's food suppliers are governed by economic, marketing and farming practices that grew up in line with food needs defined 50 years ago. However, this has not been fully acknowledged by most decision makers and consumers in the developing countries. They still believe that their diet is nutritionally poor, as compared with the affluent diet, because there is less meat, milk, poultry, etc. Many people continue to regard the ready availability of meat and milk, in large quantities and at a reasonable price, as a symbol of the affluent good life. This public perception of a high-quality diet being one which is abundant in animal products and rich in fat and sugar has been sustained by decades of public education, as well as the cultural status accorded to foods that were once luxury items in the poor man's diet. The harmful effects of this so-called affluent diet are often not generally appreciated. A diet rich in cereals, fresh vegetables and fruits with modest amounts of animal products could well meet all the nutrition requirements (including micronutrients), assuming, of course, there is adequate diversity in the diet, which is a fundamental part of the concept of healthy eating.

Of course, this does not imply that our food, nutrition and agricultural policies should ignore the relatively low proportion (about 80 million) of Chinese still under the poverty line and at risk of short food supply. However, in terms of national policy formulation, to prevent a significant increase in diet-related chronic diseases and to maintain a sustainable agricultural production should now be the main concerns.

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Dietary transition in China and its health consequences

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*Asia Pacific Journal of Clinical Nutrition 1994; 3: 111-114***中國飲食的轉變及其健康後果****摘要**

雖然平均飲食的模式仍然以植物食品為主，但過去 30—40 年中國的飲食模式發生了重大的轉變。這些轉變的特點是：動物食品增加、穀類食品減少，這些走向得到了國家食品消耗紀錄和家產特定食品調查數據的支持。這些轉變城市較農村地區明顯，初步數據顯示，飲食轉變的同時，急性傳染病減少，而慢性退行性疾病如癌症和心血管疾病增加。