

Self-Produced Food Minimizes Expenditure

China's rural population spends remarkably little on food, yet it is reasonably well-fed. Food spending by households in rural China averaged just 886 yuan (\$107) per person in 2003, the equivalent of just 2.5 yuan (30 cents) per day. By comparison, per capita food expenditures in urban China were more than double the rural average, at 2,417 yuan (\$292), and U.S. per capita expenditures were far higher (\$5,465 for urban households and \$4,739 for rural households in 2002).

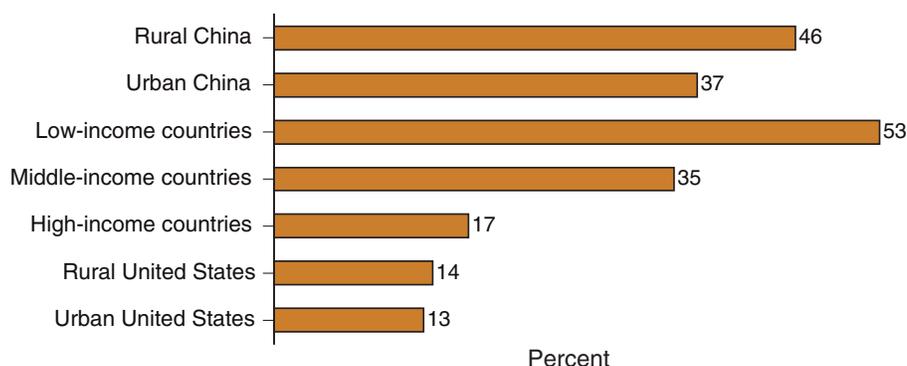
Such low levels of food expenditure suggest extreme poverty, yet rural people in China are generally not malnourished. The average caloric intake for rural Chinese persons was estimated at about 2,600 calories per day in 2003 (China National Bureau of Statistics, 2004b), above the minimum daily requirement.

Food expenditures, while low in absolute terms, are still the largest component of household budgets in rural China, accounting for nearly half of expenditures (fig. 1). The food share of expenditures in rural China is less than the average in low-income countries, but higher than in urban China and more than three times the food budget share in the United States. Clearly, food represents a major expense for households in rural China and likely influences their spending on other items.

How do China's rural citizens subsist on such low food expenditures? The price of food in rural China is very low, with many items selling for prices one-half, one-fourth, or even one-tenth the price of similar food items in

Figure 1

Food, beverage, and tobacco share of household expenditures, various countries



Note: China data are for 2003. U.S. data are for 2002. Other data are for 1996.

Sources: Compiled by USDA's Economic Research Service from China National Bureau of Statistics (2004a); Seale et al.; and U.S. Bureau of Labor Statistics.

developed countries. Also, the typical diet in rural China consists largely of inexpensive food grains and vegetables, with relatively little meat, packaged food, or restaurant meals.

Household food self-sufficiency is another major strategy for minimizing rural household food expenditures in China. Nearly all rural Chinese households produce basic food grains, and most also produce vegetables and raise hogs or poultry, a large portion of which they consume on-farm.¹ Consumption of self-produced food frees up limited cash income for nonfood purchases. In 2003, cash accounted for only 62 percent, or 552 yuan (\$67), of average rural food expenditures. The remaining 38 percent were noncash “expenditures”: the imputed value of food grown by the farm family itself plus the value of food obtained through informal exchange or other nonpurchased sources (fig. 2).

The value of noncash expenditures is imputed by China National Bureau of Statistics statisticians using estimated farm-gate producer prices. These prices are lower than retail purchase prices, so the noncash share of expenditures may actually understate the degree of reliance on self-produced food.

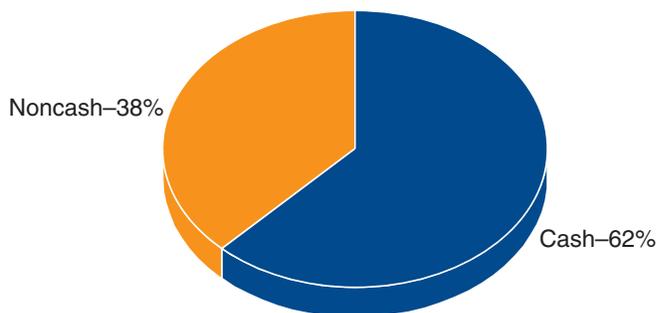
Food self-sufficiency allows China’s rural households to meet their basic nutritional needs without having to rely on nonexistent or risky markets (Von Braun). Huang and Rozelle suggest that lack of market development constrained the consumption choices of Chinese rural households. In remote rural areas, transportation costs may discourage participation in markets by driving a wedge between effective purchase prices and sale prices (Yan). Lack of off-farm cash-generating employment opportunities also can force households to rely on self-produced food.

Most Grain and Vegetables Consumed Are Self-Produced

ERS estimated the self-produced (noncash) quantity of major food items consumed by rural households in China using data on per capita consumption and purchases reported by China’s Rural Household Survey. The survey reports the quantity consumed and the quantity purchased for each major

¹ ERS analyzed data from China’s 1996 agricultural census and found that 93 percent of rural households produced grain, over 60 percent grew vegetables, and most also raised hogs or poultry. Most farms grow vegetables and raise hogs and chickens on a very small scale.

Figure 2
Rural food expenditures, cash and noncash, 2003



Source: Compiled by USDA's Economic Research Service from China National Bureau of Statistics (2004b).

food item. Assuming that the quantity consumed is the sum of the quantity purchased and the quantity self-produced, ERS calculated the self-produced quantity as:

$$\text{Self-produced} = \text{Consumed} - \text{Purchased.} \quad (1)$$

The degree of reliance on self-produced food is estimated by expressing the quantity of self-produced food as a percentage of the quantity consumed. The result of this calculation using rural household data for 2003 is shown in table 1.²

Two food categories make up the bulk of food consumed: grains and vegetables. Over 80 percent of grains, beans, and potatoes consumed were self-produced; and 70 percent of vegetables consumed were self-produced (table 1). The average rural household member consumed 184.8 kg. of self-produced grains, beans, and potatoes and just 38.9 kg. of purchased grain. Consumption of self-produced vegetables averaged 75.3 kg. per person, and purchased vegetables averaged 32.1 kg.

Other important food items were also largely self-produced, including milk (68 percent), beef and mutton (54 percent), poultry and eggs (48 percent), pork (44 percent), fruit (39 percent), and edible oil (32 percent). In contrast, sugar, alcohol, tobacco, and fish products were mostly purchased.

Even High-Income Households Rely on Self-Produced Food

Households at all income levels in rural China rely heavily on self-produced food. In 2001, the poorest rural households (those in the bottom 10 percent ranked by total household expenditure per capita) in a sample from Jiangsu,

² ERS prepared tabulations similar to those shown in table 1 using an unpublished rural household survey conducted in 2000 by academic researchers from the Universities of Toronto and California and the China Academy of Sciences. The 2000 survey findings were comparable to ERS findings shown in table 1, with about 80 percent of grain and vegetables, 40 percent of pork, and half of edible oil consumed in rural China self-produced. The 2000 survey also showed that informal exchange was small. About 10 percent of households in the 2000 survey obtained rice, flour, or noodles through informal exchange, but the amount was equivalent to about 1 percent of grain consumed by the sample as a whole.

Table 1

Source and quantity of food consumed by rural household members, 2003

Food item	Consumed	Purchased	Self-produced	
			Quantity	Share
	Kilograms		Percent	
Grains, beans, and potatoes	223.7	38.9	184.8	83
Vegetables	107.4	32.1	75.3	70
Milk	1.7	0.6	1.2	68
Beef and mutton	1.3	0.6	0.7	54
Poultry and eggs	8.0	4.2	3.9	48
Pork	13.8	7.8	6.0	44
Fruit and nuts	18.3	11.2	7.1	39
Edible oil	6.3	4.3	2.0	32
Fish, shrimp, and mollusks	4.7	3.9	0.8	16
Sugar	1.2	1.2	0.0	0
Alcohol	7.7	7.2	0.5	6

Note: Self-produced quantity is the difference between the quantity consumed and the quantity purchased. The share self-produced is the quantity self-produced as a percentage of quantity consumed.

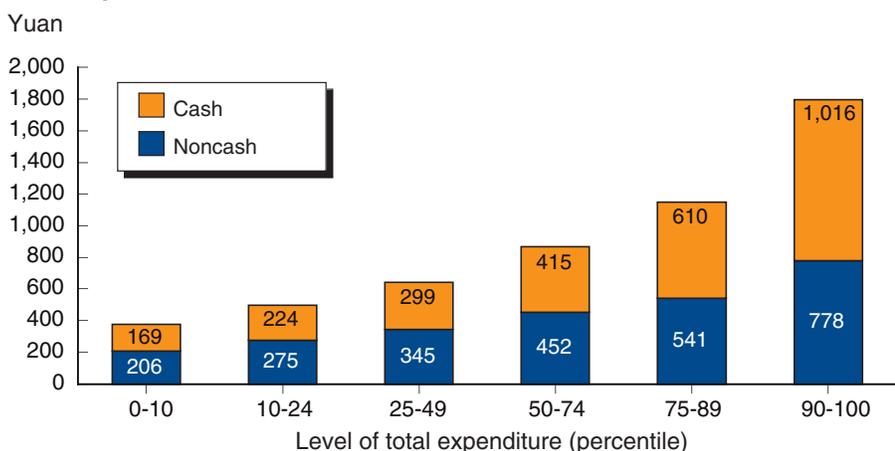
Source: Compiled by USDA's Economic Research Service from China National Bureau of Statistics (2004b).

Henan, and Heilongjiang Provinces averaged just 169 yuan (\$20) in cash food expenditures and 206 yuan (\$25) in noncash food expenditures (fig. 3). Wealthier households had high cash and noncash food expenditures, but cash expenditures were particularly high. The wealthiest rural households (those in the top 10 percent ranked by total household expenditure per capita) averaged 778 yuan (\$94) in noncash and 1,016 yuan (\$123) in cash food expenditures. Cash accounted for 46 percent of food expenditures for the poorest rural households and 57 percent for the wealthiest. While there is a sharp decrease in reliance on noncash food sources as income/expenditure rises, it is noteworthy that even the wealthiest rural households relied on noncash sources for nearly half of their food expenditures.

Eastern Provinces Are Most Commercialized

Rural households in western provinces of China rely mostly on self-produced food, while those in the more developed eastern provinces and areas near large cities rely mostly on cash purchases of food. In 2003, the cash share of food expenditures was as high as 95 percent in rural parts of the Beijing municipality and exceeded 70 percent in other municipalities and wealthy coastal provinces (fig. 4). Rural households in these regions have relatively good access to food markets and many receive cash income from off-farm employment. The cash share of food expenditures was between 40 and 50 percent for most western provinces and autonomous regions. Guizhou, one of China's poorest provinces, had the lowest cash share of expenditures, at 37 percent. Most central provinces had cash food expenditures of 55-65 percent.

Figure 3
Cash and noncash food expenditures per capita, by level of total expenditure, 2001

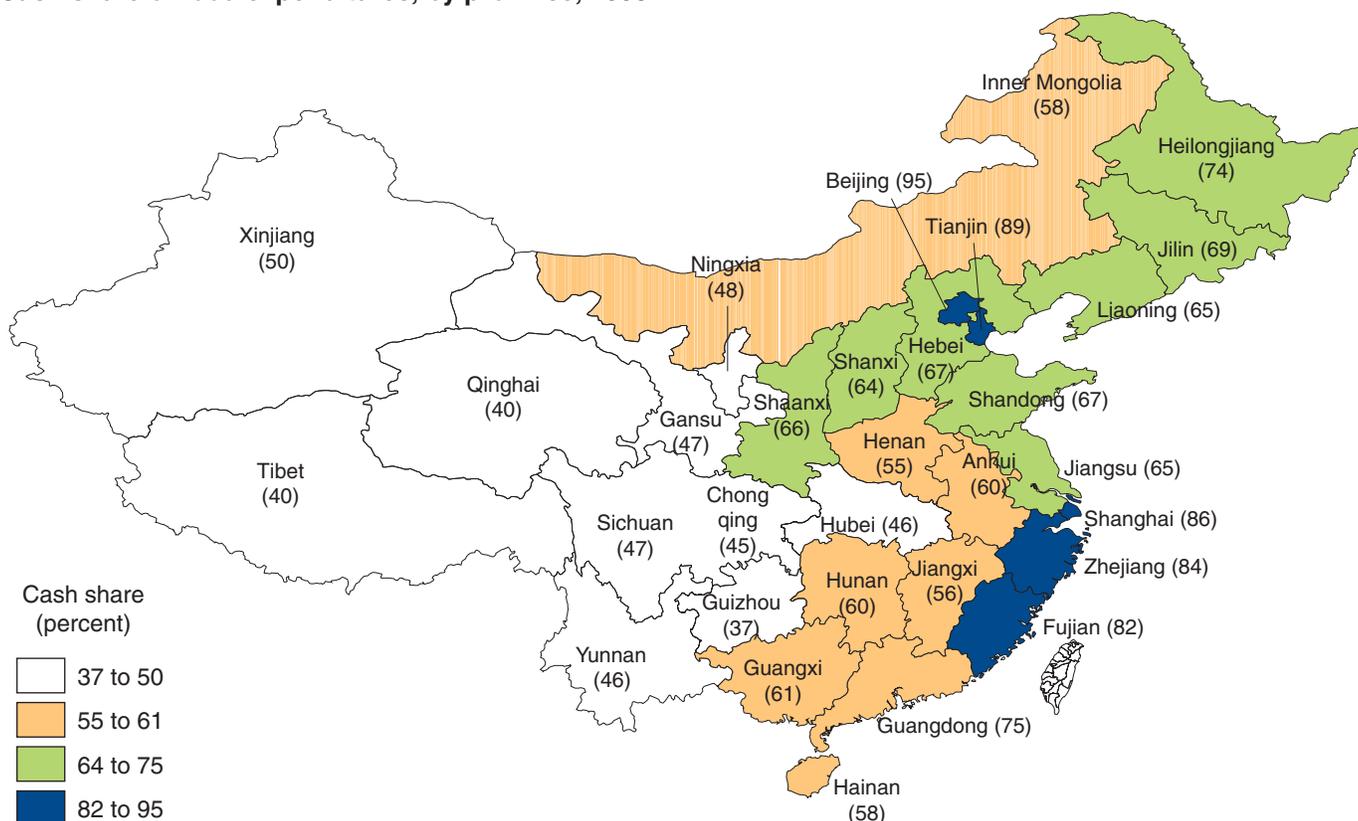


Note: Households from Jiangsu, Henan, and Heilongjiang Provinces were grouped into percentiles based on per capita living expenditures. The 0-10 category includes households with the lowest expenditures and 90-100 includes households with the highest expenditure. Chart shows average food expenditure for each group.

Source: Compiled by USDA's Economic Research Service from unpublished data compiled by China National Bureau of Statistics (1995, 2001).

Figure 4

Cash share of food expenditures, by province, 2003



Note: Figure shows cash food expenditures as a percentage of total food expenditures.

Sources: Compiled by USDA's Economic Research Service from China National Bureau of Statistics (2004b).

The regional difference in commercialization is most striking for meats (table 2). Rural households in eastern provinces purchased 85 percent of the pork they consumed in 2003, while central households purchased 56 percent and western households purchased just 29 percent. Eastern households also purchased a much higher share of their beef, mutton, poultry, and egg consumption. Consumption of fish products is highly commercialized in each region.

While rural household consumption of most nonstaple foods is highly commercialized in the eastern region, consumption of grains and vegetables is still reliant on self-production. Households in the eastern region purchased only 19 percent of their grain consumption in 2003, only slightly higher than the purchased shares in central and western regions. Eastern households purchased 29 percent of their vegetable consumption, and that was also higher than the shares in the central (20 percent) and western (18 percent) regions.

Self-Produced Food Meets Basic Nutritional Needs at Low Cost

ERS estimated rural household energy, protein, and fat intake derived from purchased and self-produced food items using per kilogram coefficients

Table 2

Share of rural household consumption that was purchased, by commodity and region, 2003

Commodity	East	Central	West
	<i>Percent</i>		
Beef and mutton	87	46	33
Pork	85	56	29
Fish, shrimp, and mollusks	85	83	80
Fruit	75	64	44
Eggs	70	44	33
Poultry	57	40	32
Vegetables	29	20	18
Grain	19	18	15

Source: Compiled by USDA's Economic Research Service from China National Bureau of Statistics (2004b).

obtained from China nutrition experts and per capita consumption and purchase quantities of various food items. In equation (2), the purchased quantity of food item i is denoted as P_i , the self-produced quantity S_i and the energy derived per kilogram from food item i as k_i . The self-produced share of calories is calculated as:

$$s = \frac{\sum_i k_i S_i}{\sum_i k_i (S_i + P_i)} \quad (2)$$

ERS made similar calculations for fat and protein.³

Based on data for 2003, rural households in China obtained 65 percent of their calories and 68 percent of protein from self-produced foods. They obtained just 35 percent of calories and 32 percent of protein from purchased foods (fig. 5). In contrast, 58 percent of fat comes from purchased foods. Calories and protein are derived primarily from grains, which make up the bulk of the diets of rural Chinese households and are mostly self-produced. Fat intake comes largely from edible oils and pork, which are mostly purchased rather than self-produced.

Popkin has described a nutrition transition from plant-based diets to more diverse, higher fat diets taking place in many developing countries. This transition is reflected in the nutritional content of self-produced and purchased foods. Traditionally, Chinese households obtained their basic energy and protein requirements mostly from self-produced grains and vegetables. As households gain discretionary income, they purchase more meats, oils, and processed food, which have a higher fat content. This pattern is also consistent with Popkin's observation that the traditional Chinese low-fat diet appears to be a product of poverty rather than health- and nutrition-consciousness.

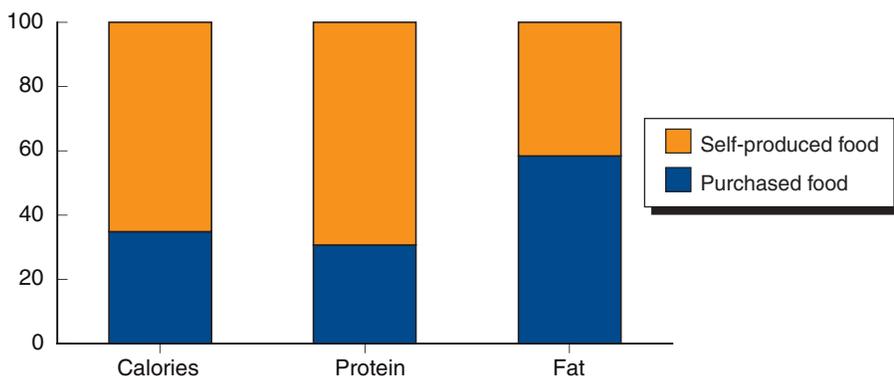
The reliance on self-produced grain is likely motivated by the low cost of achieving basic nutritional intake from this food source. ERS estimates that the cost of producing enough self-produced grain to provide the average daily intake of 2,600 calories was just 335 yuan (\$40) in 2001 (table 3). The cash outlays to purchase inputs (such as fertilizer, pesticides, and machinery

³ The amounts of various foods consumed away from home in restaurants and cafeterias are not reported by the survey. Only total spending on food away from home is available. The calculations included food consumed away from home by assuming that expenditures were allocated to food away from home in the same shares as for food at home. ERS did not have information on the composition of food-away-from-home expenditures. A sample survey by Ma et al. showed that urban households tend to eat a higher proportion of meat in meals away from home.

Figure 5

Source of energy, protein, and fat intake, rural Chinese households, 2003

Percent



Note: Estimated by multiplying coefficients developed by China nutrition experts by per capita quantities of purchased and self-produced foods.

Source: Estimated by USDA's Economic Research Service from China National Bureau of Statistics (2004b) and unpublished data.

Table 3

Estimated cost of caloric intake from different food sources, 2001

Food item	Price per kilogram ¹	Energy yield ²	Annual cost of 2,600 calories per day ³
	<i>Yuan</i>	<i>Calories per kg.</i>	<i>Yuan</i>
Self-produced grain	0.89	2,540	335
Cash outlays ⁴	.53	2,540	200
Labor cost ⁵	.36	2,540	135
Purchased:			
Grain	1.60	2,540	600
Pork	9.30	3,950	2,230
Poultry	7.70	2,240	3,260
Eggs	4.30	1,300	3,140
Fish	5.70	660	8,200

¹Average calculated using 2001 rural household survey data from Jiangsu, Henan, and Heilongjiang Provinces.

² China nutrition department unpublished estimates.

³ Cost = (Price ÷ Energy yield) x 2,600 x 365.

⁴ Input costs and taxes per kilogram of output of grain calculated from National Development and Reform Commission data.

⁵ Labor cost per kilogram of grain output calculated from National Development and Reform Commission data.

Sources: Estimated by USDA's Economic Research Service from unpublished data compiled by China National Bureau of Statistics (2001); National Development and Reform Commission; and unpublished data.

services) and pay taxes constituted just 200 yuan (\$24), while the labor cost was another 135 yuan (\$16). However, most labor requires little or no cash outlay since it is provided mainly by family members. Family labor has little opportunity cost since off-farm work opportunities are limited and work occurs for only a few days at planting and harvest. Thus, rural households may consider only the cash costs of 200 yuan (\$24) as the cost of producing grain for their own consumption.

An intake of 2,600 calories obtained entirely from purchased grain would cost 600 yuan (\$73), three times the cost of obtaining the same number of calories from self-produced grain. Calories from purchased pork cost over 10 times as much as those from self-produced grain, and the cost of calories from poultry, eggs, and fish is even higher. Thus, rural families can obtain their basic caloric intake from self-produced grain with minimal cash expenditure and a modest labor input. The scarcity of cash income and the abundance of underemployed rural labor probably encourage this cash-saving strategy.

ERS estimates average per capita consumption of self-produced grains in rural China of 185 kg. (see table 1), equivalent to about 1,300 calories per day, about half of the average caloric intake of rural Chinese people. Production of 185 kg. of grain requires 89 yuan (\$11) in cash outlays for inputs, 6 days of labor, and just 0.5 mu of cropland (mu equals about one-sixth acre). The minimal labor requirements of grain production leave plenty of labor free for off-farm work or other activities. The average household cropland holding of 2 mu per person is also adequate to provide household food grain needs with 1.5 mu available for cash crop, livestock feed production, or other uses (see box, "Household Economics in Rural China").

Because rural households meet most of their basic nutrition requirements by consuming self-produced grain, they are able to devote most of their scarce cash income to expenditures on housing, schooling, transportation, and other nonfood goods and services. Even households with members employed off-farm and those with small land holdings can grow grain for their own consumption.

Household Economics in Rural China

China's more than 200 million rural households have, on average, four persons who must be fed, clothed, housed, educated, treated for medical problems, and provided with other goods and services. A rural household has limited labor, land, livestock, machinery, and other resources that can be used to grow food for consumption or to generate cash income by growing cash crops or working for wages.

In 2003, rural households averaged three able-bodied laborers and two mu (one-third acre) of cropland per person. (Under China's collective land ownership system, village authorities allocate land to each rural household based on various criteria, including the number of household members that must be fed and the number of available farm laborers.) Grain production requires only 11 days of labor per mu (National Reform and Development Commission), but off-farm earning opportunities for rural Chinese workers are limited due to geographic isolation of many villages and a surplus of rural laborers. Workers are mainly employed in agriculture, but most rural households have at least one member working off-farm at wages that are frequently 10 yuan (\$1.20) per day. Many households have one or more members who are able to perform farm labor but do not work off-farm due to age or child-care responsibilities.

In 2003, the average net income per rural household member was 2,622 yuan (\$317), most of which was derived from farming. Average cash income from wages was 917 yuan (\$111). Given limited cash income availability, the array of household expenditures, and the minimal labor requirements of grain production, most rural Chinese households rely heavily on self-produced grain for their diets.

Rural Chinese households at a glance, 2003

Item	Unit	Average value
Persons per household	Number	4
Laborers per household	Number	3
Cropland per person	Mu	2
Grain yield ¹	Kg. per mu	350
Grain consumed per year	Kg.	224
Self-produced grain consumed per year	Kg.	185
Living expenditures per capita	Dollars	235
Food expenditures per capita	Dollars	107

¹ Source: National Development and Reform Commission.

Source: Compiled by USDA's Economic Research Service from China National Bureau of Statistics (2004b), except where noted.