



People's dietary patterns in China have altered to include more meat and purchased foods, such as from this Beijing kebab stall.

WHY CHINA'S CHANGING DIET IS A BELLYACHE FOR PUBLIC HEALTH

The shift from traditional cuisines to a Western diet is creating issues for nutritionists and the pursuit of public health. **By Yvaine Ye and Jack Leeming**

In Shanghai, China's most populous and wealthy city, 61% of people dined out at least once a week before the COVID-19 pandemic – a trend that's likely to return after the government lifted restrictions to curb the spread of SARS-CoV-2. "Every corner you turn in Shanghai, you see hot-pot restaurants, barbecue restaurants and bubble-tea shops," says Xu Lin, a nutrition researcher at the Shanghai Institute of Nutrition and Health, Chinese Academy of Sciences.

These venues are a sign of the rising income that China's middle class has enjoyed since the

1980s, when Lin was studying for her PhD, but some also see them as a public-health concern. Lin says many foods at these restaurants contain high amounts of fat, sugar and salt that consumers are not necessarily aware of.

Lin's doctoral adviser was Colin Campbell, a nutritional biochemist at Cornell University in Ithaca, New York, and co-author of *The China Study*, a 2005 bestselling book. It is based on a 20-year study that connected the diets of people in rural China – which are vegetable-rich and low in animal products – with a much lower risk of heart disease than is the

case for people in other parts of the country. Although the project's findings and statistical analyses have been disputed, there's no doubt that China's diet has changed.

With rapid economic development and urbanization, dietary patterns in China have become more Westernized, with increased consumption of refined grains and meat. This is fast becoming a concern as many of the nation's citizens get wealthier, fatter and more susceptible to 'rich world' health problems.

"There's no other lower- or middle-income country experiencing what China is

spotlight

experiencing,” says Barry Popkin, a nutrition researcher at the University of North Carolina at Chapel Hill. “China is beginning to look like the United States and United Kingdom, where we’re starting to get adolescents with diabetes. Thirty years ago, you didn’t get diabetes until you were 45 or 50 or older.”

The statistics are weighty. “Before the 1980s, the diabetes rate in China was lower than 1%. Now it’s over 12%,” says Lin. “The rate of increase is faster than in the United States.”

Nourishing a market economy

“When I was a child in the 1980s, my main food was a vegetable- and grain-based diet,” says Shaohua Zhan, a sociologist at Nanyang Technological University in Singapore. Zhan grew up in rural China and witnessed the drastic dietary shift at first hand. Animal products were rare when he was growing up, even though his family raised chickens. They had to sell most of the eggs and some chickens to supplement their income, Zhan says.

Since Zhan’s childhood, the average Chinese consumer has seen their disposable income increase by 100 times. According to data from the National Bureau of Statistics of China, the disposable income of urban residents in 1980 was less than 500 yuan each per year (US\$294 at the time). Rural residents, who then accounted for 80% of the country’s population, each had only 190 yuan to spend or save per year. By 2021, the annual disposable income of an urban dweller had risen to more than 47,000 yuan (\$7,288 at 2021 rates), and people in rural areas each had almost 19,000 yuan a year.

The boom began in the late 1970s, when the Chinese government introduced elements of a market economy to the communist country, championed by then-leader Deng Xiaoping. The countryside saw an exodus of rural residents, who moved to cities to take jobs with higher incomes. Zhan says this migration affected what people ate, with more people purchasing food instead of consuming what their families grew.

As incomes rose further, people in rural areas also consumed more purchased and processed foods, says Zhan. Now, he says, in cities and rural areas, “there are new kinds of food, which are not very healthy. But they are convenient, and they often taste better.”

In 1982, fat from food contributed to 12% of the average total energy intake of a Chinese adult, according to a national nutrition survey conducted by the Chinese Center for Disease Control and Prevention. By 2015, that proportion had grown to 35% per person – roughly a percentage point behind the average US figure. Dietary fat intake is associated with multiple chronic diseases, including obesity,

heart disease and cancer. As a result, the World Health Organization and many governments recommend that energy from dietary fat should not exceed 30% of an individual’s daily intake.

“The wide availability of unhealthy food, together with China’s increasingly convenient food-delivery services, have exacerbated all the diet-related health problems like diabetes and hypertension,” Lin says.

The COVID-19 pandemic might have made the issue worse, according to a 2021 study that examined what Chinese customers ordered at restaurants before and during the pandemic¹. Researchers found that, compared with the period before the COVID-19 outbreak, people tended to order more food, probably as a result of mental stress. The study suggests that the pandemic is associated with higher calorie and salt intakes in Chinese people.

“The central government is paying unprecedented attention to residents’ health.”

And this change is taking its toll. According to a 2020 report by China’s National Health Commission, more than 50% of Chinese adults and nearly 20% of school-age children are overweight or obese. Without effective interventions, researchers estimate² that more than 65% of adults and 30% of school-age children in the country could become overweight or obese by 2030.

Salt in the wound

Fatty foods are not the only issue that China’s physicians could be cursing in the future. Salt intake is among the highest in the world: Chinese adults eat, on average, more than 10 grams of salt a day. This is more than twice the limit recommended by the World Health Organization to prevent high blood pressure and reduce the risk of cardiovascular disease. Heart disease is the leading cause of death in China, killing about four million people each year³.

Monique Tan, a public-health researcher at the Queen Mary University of London, says that, before refrigerators became prevalent, Chinese people consumed vegetables preserved with salt. “People have kept their traditional foods and cuisine, which usually comes with a high salt content,” she says.

Although the main source of salt intake in China still comes from home cooking, the rapid increase in consumption of processed and restaurant foods could push China to become more like Western countries, where salt comes mostly from processed foods, Tan says.

“People nowadays can order late-night snacks or even meals to their doorstep very easily, which can contribute to even greater total salt and energy intake,” she says. Tan’s research⁴ shows that reducing the Chinese population’s salt intake by a single gram each day could prevent almost nine million deaths from cardiovascular disease by 2030.

A China-specific problem

Most of the world’s clinical-nutrition research has been conducted on populations in Western countries. But conclusions drawn from such experiments cannot be applied directly to Chinese people, because of genetic variation and their distinct lifestyle, Lin says. And within the Chinese population are multitudes of genetic differences, which many people argue are underexplored.

For example, the metric of body mass index (BMI) is widely used worldwide to measure whether a person is underweight, healthy, overweight or obese. But research has found that Chinese people are more susceptible to the effects of obesity on blood pressure and other risk factors for cardiovascular disease than are people of other ethnicities⁵. People in China are also more likely to develop metabolic disorders, such as diabetes, for each unit increase in BMI.

Lin says clinical-nutrition research in China is still lacking. “Nutrition research requires a large amount of funding and human effort, both of which we don’t have enough of,” she says.

There are other layers to tracking the nutrition of China’s population. Michelle Lau, a nutritionist at the consultancy and communications firm Nutrilicious in Hong Kong, points out that diets are drastically different even within China. “People here still hold their own culture and their dietary preferences,” she says. “In the north of the country they eat more wheat and more meat, such as in Beijing,” she says. “But if you’re in, for example, Szechuan province, you’ll eat more spicy food and have better access to green vegetables.”

The country also has an ageing population. By 2035, it is likely to “become a severely ageing society” with an estimated 400 million people – or 30% of its population – aged 60 or older, according to a 2022 article in China’s state media.

A 2019 study by the Chinese Center for Disease Control and Prevention reported that 76% of people aged 60 years or older develop at least one chronic disease. About 58% of older people have hypertension and nearly 20% have diabetes⁶. “Chronic disease in an ageing society poses a serious and pressing challenge to China’s public health. What we are facing now is only the tip of an iceberg,” says Lijing Yan, a global-health researcher at Duke Kunshan

University near Suzhou, China.

“Traditionally, people think diet no longer matters when you’re old, but we show the opposite,” says Yan. She co-authored a study of 35,000 Chinese people aged 80 and over that shows sticking to a healthy diet is associated with a significant reduction in overall mortality⁷. “It’s never too late to pay attention to healthy eating,” Yan says.

Policy approaches

Facing the rapid increase in diet-related chronic diseases, the Chinese government has launched several strategic plans and policies in a bid to slow the trend. In *Healthy China 2030*, published in 2016, and the *National Nutrition Plan*, released in 2017, the central government pledged to cut Chinese residents’ salt intake by 20% by 2030, and “significantly slow the overweight and obesity growth rates”.

“The central government is paying unprecedented attention to residents’ health,” says Yan. But the policies have yet to be fully implemented by local governments and agencies.

The documents are generally advisory, says Jikun Huang, director of the Center for Chinese Agricultural Policy at Peking University in Beijing. “We made a nutrition plan advising people. But the guidelines aren’t that specific – they apply to women, men, children, rural and urban people. If you’re advising on the meat consumption and calorie count for everyone, you’re not going to get it right.”

Huang compares this advice to that offered by many countries in Europe, which he says suggests specific nutrition plans for individual age groups. “Without that detail, it’s much harder to advise people,” he says.

The government’s approach has been to focus on food security before worrying about good nutrition, he says. “It’s transformed gradually from grain economy and security. But I believe in the next ten years there will be more interest in public and government policy for health and nutrition.”

“We have a saying in China: you get enough to eat; then you eat better. It’s step by step.”

Yvaine Ye is a US-based freelance writer. **Jack Leeming** is a careers editor at *Nature* in London.

1. Zhu, C., Lopez, R. A., Gao, Y. & Liu, X. *China World Econ.* **29**, 73–94 (2021).
2. Wang, Y., Zhao, L., Gao, L., Pan, A. & Xue, H. *Lancet Diabetes Endocrinol.* **9**, 446–461 (2021).
3. Zhang, X. et al. *Lancet Public Health* **7**, E1041–E1050 (2022).
4. Tan, M., He, F., Morris, J. K. & MacGregor, G. *BMJ Nutr. Prev. Health* **5**, e000408 (2022).
5. Zheng, R. et al. *J. Clin. Endocrinol. Metab.* **106**, e2775–e2788 (2021).
6. Wang, L. M. et al. *Zhonghua Liuxingbingxue Zazhi* **40**, 277–283 (2019) (in Chinese).
7. Yan, L. L. et al. *Int. J. Behav. Nutr. Phys. Act.* **19**, 60 (2022).



Bean-curd-skin production at a processing plant in Tāizhōu.

RICH PICKINGS IN CHINESE FOODS

Studies reveal the benefits and risks of some Chinese dietary staples. **By Michael Eisenstein**

The richness and diversity of Chinese culinary culture is unsurprising given the country’s vast size and ancient history. But even though it would be reductionist to refer to a monolithic ‘Chinese cuisine’, there are some ingredients and foodstuffs that are particularly commonplace in the Chinese diet and whose roots stretch back across millennia, originating in the nation’s early history.

The modern Chinese diet has changed considerably, with a burgeoning middle class developing an ever-growing taste for Western menus. But traditional foods and ingredients continue to enjoy huge popularity at home as well as abroad, both for their flavour and for their nutritional benefits. Here is a summary of recent nutritional research into some of these traditional favourites.

For much of its early history, tea was brewed as a prescription rather than a refreshment. Legend has it that the Chinese emperor and herbalist Shennong – known as one of the fathers of traditional Chinese medicine – consumed the first cup of tea nearly 5,000 years ago, touting the drink’s detoxifying and invigorating effects.

Even today, the potential health benefits of regular tea consumption remain an active area of research. Although the magnitude and nature of those effects remain unclear, there is evidence that tea can confer protection against at least some chronic medical conditions.

In 2022, for example, Maki Inoue-Choi, an epidemiologist at the US National Cancer Institute in Bethesda, Maryland, and her colleagues published a study¹ monitoring how tea consumption affected mortality risk in almost