

Cuisine: Hangzhou foods and their role in community health and nutrition

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Regional diets and associated cuisines and their contribution to overall regional nutrition are increasingly being scrutinized by scientists for their relationships to human health. The Hangzhou region in China has lower mortality rates associated with cardiovascular disease, lower incidences of diabetes mellitus and better blood pressure in the local population and the links between these lower rates of disease and the traditional regional cuisine are a source of interest. Zhejiang is located on the East Coast of China. The Northern part is well known for the extensive network of channels that produce a vast array of aquatic foods. The South West region and its extensive foothills are known for the production of rare and expensive venison and many types of fungi. The region is also known for the production of over ten different types of edible bamboos. The cuisine also involves many different types of green vegetables that accompany every meal. The best way to describe Hangzhou cuisine is the wide use of southern ingredients cooked in the typical northern manner. This combination leads to a unique taste combining the dainty and the smooth, the crisp and the tender, the simple and the elegant, the small and the exquisite. Overall the cuisine is known for its low saturated fat and high PUFA, particularly long-chain omega-3 PUFA and fibre. There is extensive use of plant based foods high in complex phytochemicals and trace elements. This combination leads to a balanced nutrition that contributes to the community health in Hangzhou.

Key words: Hangzhou/Zhejiang, nutrition, cuisine, foods, health

Key food sources and composition

Zhejiang is a relative small province, located on the East Coast of China - Hangzhou is the capital city of Zhejiang. The Northern part is well known by the extensive network of channels. The South West region has extensive foothills. The special geographical environment of Zhejiang produces a vast variety of foods.

Fish and meat products

Aquatic food

Zhejiang produces abundant aquatic foods, which come from fresh water, estuaries and ocean. The harvested aquatic food is either from wild stock or a product of the extensive local aquaculture industry. They are well known as a major source of C20 and C22 omega -3 polyunsaturated fatty acids (PUFA), trace minerals such as zinc, iron and iodine and vitamin A and D. Most commonly consumed aquatic food in Hangzhou is fish, crab, prawn and squid. However, crustaceans, eel, snails and seaweeds are increasingly becoming popular as seen in trade figures.¹ The consumption of seaweeds contributes to the intake of trace elements, especially iodine (important for a healthy thyroid gland).

Meat and poultry

Pork, chicken and duck are the most commonly consumed animal products, providing a large proportion of animal protein intake, iron, vitamin B₁₂ and other minerals and

vitamins. They are also an important source of polyunsaturated fatty acids.

Plant food products

Legumes and their products

Soybeans, red beans and mung beans are the most favoured dietary legumes. Red beans and mung beans are commonly processed to a sweetened bean paste. This paste can be consumed directly or used in the preparation of baked products such as cakes, and as an ingredient for steamed buns. Red beans and mung beans are also used widely to make porridge. Soybeans are processed into many different products with different textures and tastes.² Commonly available processed soybean products in Hangzhou are soybean milk, jellied bean curd, tofu, soybean cake, dried bean milk cream in tight rolls, thin sheets of bean curd, bean paste, fermented tofu with and without odour, fermented soybean, and soybean sauce. Legumes and their products are a good source of amino acids and phytochemicals, such as isoflavones, phytochemicals and saponins. They are also a rich source of trace

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Accepted 15 January 2004

elements, including calcium, and a range of vitamins, including vitamin B₁.

Rice

Rice is the most important source of dietary carbohydrates in Hangzhou. There are many different types of rice. Based on the colour, rice can be divided into white, black and red rice. White rice is normally consumed as steamed rice, as porridge or as fermented rice. Black and red rice are normally consumed as porridge. However, wheat flour based foods, like steamed buns, noodles and dumpling pastry, are also consumed frequently by some people. The different colours suggest that a range of phytochemicals are associated with each type of rice - suggesting that each variety may have different health benefits to consumers.

Vegetables

There are a great variety of different vegetables available in Hangzhou. Green leafy vegetables are essential for Zhejiang/Hangzhou cuisine and they accompany almost every meal. The most commonly available green leafy vegetables in Hangzhou are bok choy, spinach, Chinese broccoli, three-coloured amaranth, tuber onion, Chinese cabbage, caraway and lettuce. Commonly available flowering vegetables include citron daylily, cauliflower and broccoli; leguminous vegetables are green bean, snake bean, snow pea, pea and horsebean; fruiting vegetables that are commonly consumed include cucumber, tomato, capsicum, towel gourd, pumpkin, winter melon, bitter melon, chili, chili pepper, zucchini, corn and eggplant; rhizomatic and bulb vegetables are onion, spring onion, leek, lotus root, turnip, radish, carrots, potato, sweet potato, taro, yam, water caltrop, celery, garlic bulb and asparagus. The vegetables are good sources for vitamins, minerals, dietary fibre, as well as omega 3 polyunsaturated fatty acid (leafy vegetables).³ The cuisine is rich in cruciferous vegetables that include the Brassica family. This group of vegetables is known to contain the phytochemicals glucosinilates. Many of the glucosinilates, such as sinigrin and sulphoraphane, are known to inhibit or prevent cancer formation in humans. Other horticultural foods commonly consumed in the local cuisine are known to contain phytochemicals important for health and well being in humans.⁴ The region is also known for the production of over ten different types of edible bamboos that are an excellent source of dietary fibre.⁵ Cured potherb mustard, bok choy, kohlrabi and turnip are also commonly consumed in Hangzhou both at home and in restaurants.

Mushrooms

The South West region of Zhejiang and its extensive foothills are known for the production of rare and expensive venison and many types of fungi. More than ten different edible mushrooms are grown, such as the black *auricularia auricula* and white *auricularia auricula*. Mushrooms are good sources of three B group vitamins (riboflavin, niacin and pantothenic acid), copper, selenium and potassium.⁶ *Auricularia auricula* is a good source of calcium, iron, niacin and dietary fibre.⁷

Fruits

Many different types of fruits are grown in the Zhejiang/Hangzhou region. The most common fruits in the region are: citrus, melons, grapes, apples, grapefruit, apricots, bananas, peaches, pineapple, pears, berries, kiwi, plum, cherries and nectarines. They are good sources of vitamin A and C, folate, magnesium, calcium and dietary fibre.⁸ Fresh fruits are well known to be sources of antioxidants and other phytochemicals that are important for human health.

Nuts and seeds

There are a number of nuts and seeds commonly consumed as ingredients, incorporated into dishes, or directly consumed as a TV snack in Hangzhou. The most commonly consumed are peanuts, walnuts, sunflower seeds, almonds, pine nuts, hazels, chestnut, lotus nuts, watermelon seeds, California pistachios, pumpkin seeds and sesame seeds. Nuts and seeds have long been recognized to be good food for health. They are a good source of calcium, potassium, magnesium, manganese, selenium, vitamins A, C and E, folate, niacin, plant protein, phytochemical compounds and polyunsaturated fatty acids.

Culinary herbs and spices

Most commonly used herbs and spices in Hangzhou cuisine are ginger, pepper, ground Szechuan pepper, spring onion, onion, garlic and chili. However, cinnamon, aniseed, fennel, clove, curry and five spice powder are occasionally used in Hangzhou cuisine, mainly in restaurants for pot-roast and bouillon. Most herbs and spices contain phytochemical compounds that can benefit human health. These include, *s*-allyl-L-cysteine and diallyl disulfide from garlic, gingerols from ginger, organosulfur compounds from onion, capsaicins from chili, piperines from pepper, cinnamaldehyde from cinnamon, anethole and gamma-himachalene from aniseed, (E)-anethole, fen-chone and methyl chavicol from fennel and eugenol from clove.^{9,10}

Novel foods

Aloe jelly, ginkgo fruits, stir fried lily bulbs with ginkgo fruits are becoming popular dishes in restaurants. Cacti caudex, well moss, pumpkin vine and sweet potato vine are also increasingly consumed in Hangzhou.

Key beverages

- Green tea (Dragon well tea) is the most commonly consumed beverage. Almost every adult drinks green tea daily. Chrysanthemum tea is also a traditional tea, popular in summer in Hangzhou. However, some groups in the region also consume some novel herbal teas such as red berry tea, sweet-scented osmanthus tea, ginkgo tea, ginseng tea, medlar, rose, kuding tea, wild chrysanthemum, honeysuckle, plumule of lotus flower, ginseng flower and barley tea, and Lipton tea is served in some restaurants.
- Alcoholic beverages: Shaoxing yellow wine, a rice wine, is the most popular alcoholic beverage in the region. However, in recent years, red grape wine, white wine and beer have become increasingly popular. Different fruit and vegetable juices are also

becoming increasingly popular in the region, especially during social occasions. Some children and young people favour cordials, carbonated and sparkling water.

Region specific products containing phytochemicals

Many plant products are consumed because of their real and perceived importance for health and well being. It is well established that plant foods have been shown to contain important nutritional compounds. Both macronutrients and micronutrients are found in fruit and vegetables. The importance of plant products in the human diet has led to the 'five a day' and 'seven a day' campaigns. These campaigns are driven by the nutritional importance of plant foods in terms of essential vitamins, essential trace elements, sources of energy and fibre. There is also increased interest in the role of phytochemicals in the prevention of chronic diseases. Phytochemicals are biologically active compounds that are found in relatively small amounts in plant foods.⁴ These compounds have been linked to human health by contributing to protection against degenerative diseases. The classification of phytochemicals can be rather complex. There are many phytochemicals that may have an impact on human health. Every food plant contains many hundreds of chemical compounds. The importance of some of these may yet be undiscovered or analytical methods not yet developed to allow quantification. For example, over 200 chemical compounds have been identified in cabbage.⁴ Research in this area is continuously expanding. Phytochemicals have been linked to many other positive health effects in human and animal studies, including coronary heart disease, cancer, diabetes, high blood pressure, inflammation, infection, psychotic diseases, ulcers and macular degeneration. It is becoming evident that many phytochemicals may have multiple actions on human health.

Until we have a full understanding on how phytochemicals assist humans with health and well being there are advantages in consuming a varied diet, rich in phytochemicals. Early historical records from Hangzhou suggest that this area had plants which were rich sources of phytochemicals. Marco Polo visited this city in the 13th century and wrote: "*In this part are the ten principal markets, besides these, there are a vast number of others in the different parts of the town. In each of the squares is held a market three days in the week, frequented by 40,000 or 50,000 persons, who bring for sale every possible necessity of life Those markets make a daily display of every kind of vegetable and fruit; and among the latter there are in particular certain pears of enormous size, weighing as much as ten pounds a piece, and the pulp of which is white and fragrant like a confection. The peaches in their season are both yellow and white, of every delicate flavour.*"

The tradition of a varied diet rich in phytochemicals still continues today. The list below shows potential plant sources of phytochemicals found in the Hangzhou region:

Water shield

Edamame (mao dou)

West Lake Dragon Well green tea

Changxing Zishun Tea

Pingshui green tea

West lake lotus root

Xiaoshan red bayberry

Tianmu dried bamboo shoots

Over 100 varieties of fresh bamboo

Changhua chestnut - Changhua Hickory Nut.

Jiande strawberry

Red, black and yellow rice

Black and white mushrooms

Xiaoshan dried radish

Zhuwu green plum

Oranges and tangerines

Chaoshan plums

Hangzhou White Chrysanthemum

Fengqiao torreyia nuts

Nanhu Lake water chestnut

Fenghua Honeydew Peach

Tangxi Loquat

The intake of such a large variety of plant foods suggests that phytochemical intake by the population in the Hangzhou area remains an important factor for the health of the population. In particular, Hangzhou has three major advantages over Western diets: (1) it retains a large number of small growers that use their own seed stocks, each bringing their products to market; (2) plant food is consumed fresh and not stored for long periods of time, assuring adequate levels of phytochemical retention in the plant food consumed; (3) the area is well known for its large range of unique plant foods containing special phytochemical profiles.

Food chain

Food companies supply foods into the markets. However, some foods are supplied directly by farmers, such as some vegetables, fruits, meat, poultry and aquatic products. Free market of agricultural products, supermarket, restaurant, café shop, teahouse, take away food shop and street food are everywhere. Few people still cook breakfast at home - this is not just because of time savings and convenience, but also because of the affordable prices available outside the home for prepared food. Most people have their breakfast outside on the way to school or workplace, and some people buy breakfast to eat at home. The most popular breakfasts are soymilk, porridge, steamed bun, steamed buns with different sweetened bean paste fillings, fried cake, pancake, steamed dumpling, dumpling soup and noodle soup served with cured vegetables.

All the universities in Hangzhou and some schools have eateries or canteens. A major point of difference between Chinese and western tertiary education is that Chinese universities provide accommodation for every student. University students can have all their meals on campus during the week. However, some meals may be consumed outside campus during weekdays. In primary and high schools, most students have their lunch at the school. In the workplace, most companies provide free lunch for all employees. Lunch typically consists of 3-4 courses i.e. 2-3 dishes served with rice or steamed bun. Most people have their dinner at home. A normal dinner consists of 5-6 courses for a family consisting of three or

four. The major courses consist of the following dishes: 1 meat or poultry dish, 1 tofu product dish, 1 aquatic product dish and 1 green leaf vegetable dish, plus a soup, served with steamed rice. People often purchase live aquatic products and poultry in the market, and ask the vendor to process and prepare the product for cooking - the food is usually cooked on the same day. A few families occasionally have noodles or dumplings for dinner in Hangzhou.

Eating out together with family members or friends is a traditional habit of local citizens in Hangzhou. Hospitable Hangzhou people commonly invite visitors to go to a restaurant to have dinner. There are many luxurious and large-scale restaurants in Hangzhou, where deluxe foods are served. In Hangzhou, people like to order fresh and live dishes. Aquatic products are all live in the restaurants and customers can choose which one they like, and then the chef will cook it immediately. Tea houses are another kind of special eating out place with a more relaxed and luxurious environment, where buffet food with a wide range of choices is served. A customer needs to order tea from hundreds of different teas and the price is dependent on the tea. Waitresses will perform a tea ceremony if the customer orders an oolong family tea. Most teahouses also have live music. Some teahouses provide karaoke instruments in a VIP room; customers can sing and dance there. Restaurant and teahouses are heavily used on weekends.

Hangzhou cuisine

The major type of cuisine in Hangzhou is the Zhejiang style of cuisine, which is recognised as one of the eight major cuisines in China. Unlike typical Chinese cuisine that has been characterised by the pork-soy tradition, Hangzhou cuisine has developed a diverse range of dishes based on the greater variety of raw materials available. The best way to describe Hangzhou cuisine is the wide use of southern ingredients cooked in the typical northern manner. This combination leads to a unique taste, combining the dainty and the smooth, the crisp and the tender, the simple and the elegant, the small and the exquisite. The most common cooking techniques in Hangzhou are: stir-fry, fry, braise, steam, fry after stewing or stew after frying and quick-fry. Many utensils are used, the basic being the wok, frying pan, pan, bamboo steamer/steam box, pancake turner, scoop and terrine.

There are many reputable traditional dishes in Hangzhou. The "terrine fish-head tofu" is a speciality, and most valued over other dishes. It can be easily prepared at home or in the restaurant. However, it takes a

longer time to prepare than other dishes. It contains high levels of omega-3 poly-unsaturated fatty acids such as 28:3n-3, 20:5n-3, 22:5n-3 and 22:6n-3, calcium, zinc, iron, iodine, isoflavones, phytosterols and other functional phyto-chemical compounds, vitamins A and D, and both aquatic and plant proteins. Some novel and functional materials have also been used in Hangzhou cuisine such as "aloe extract curd" and "gingko fruits".

Regional diets and associated cuisines and their contribution to overall regional nutrition are increasingly being scrutinised by scientists for their relationships to human health. The Zhejiang/Hangzhou region in China has a longer longevity (73.4 for male and 78.0 for female)¹¹ than national average (69.8 for male and 72.7 for female),¹² and the links between these longevity and the traditional regional cuisine is a source of interest.

Zhejiang/Hangzhou cuisine is known for its low saturated fat and high PUFA content, particularly long-chain omega-3 PUFA. Increased consumption of dietary n-3 polyunsaturated fatty acid (PUFA) raises n-3 PUFA levels in the tissues.¹³ Table 1 shows the plasma phospholipids long-chain n-3 PUFA composition in healthy male Caucasian Australian and Hangzhou Chinese. The 20:5n-3, 22:6n-3 (two main n-3 PUFA found in fish) and total long-chain n-3 PUFA were significantly higher and 22:5n-3 (a main n-3 PUFA found in meats and meat products) was significantly lower in Hangzhou Chinese than Caucasian Australians. This result indicates that consumption of fish was higher and meat was lower in Hangzhou Chinese than Caucasian Australians.

Increased levels of long-chain n-3 PUFA in the tissues can lead to beneficial effects on the prevention of cardiovascular disease and its risk factors. For example, they have been shown to reduce both systolic and diastolic blood pressure,¹⁴ prevent cardiac arrhythmias,^{15,16} increase heart rate variability,¹⁷ improve arterial compliance,^{18,19} reduce levels of blood triacylglycerols,²⁰ and plasma fibrinogen²⁴ and 2- and 5-series eicosanoid production.²¹⁻²³ They have also been shown to have anti-cancer²⁵ and anti-inflammatory activities,²⁶ to reduce the risk of developing type II diabetes,²⁷ and to have a beneficial effect on attention-deficit/hyperactivity disorder,^{28,29} schizophrenia,³⁰ and for the management of depression in adults.^{31,32} The beneficial effects of omega 3 fatty acids are in addition to the benefits associated with the extensive use of plant based foods, high in phytochemicals, dietary fibre, vitamins and trace elements. Overall this combination leads to a nutritious cuisine that contributes to the community health in Hangzhou.

Table 1. Long-chain n-3 PUFA composition of plasma phospholipids in Hangzhou Chinese and Caucasian Australians (% of total fatty acid, mean \pm SD)

	Hangzhou Chinese (N=61)	Caucasian Australian (N=60)	P value
20:5n-3	2.3 \pm 0.5	1.0 \pm 0.3	<0.0001
22:5n-3	0.4 \pm 0.2	1.2 \pm 0.2	<0.0001
22:6n-3	4.9 \pm 2.4	3.3 \pm 0.8	<0.0001
Total LC n-3*	7.5 \pm 2.6	5.6 \pm 1.0	<0.0001

*LC n-3 = long-chain n-3 PUFA

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烹饪：杭州饮食在该地区居民健康和营养中的角色

Cuisine: Hangzhou foods and their role in community health and nutrition

Duo Li and Robert Premier

从健康角度而言，我国的传统烹饪和饮食有着自己优势和特点。近些年来，一个地区的饮食和烹饪对该地区整体营养的贡献以及与该地区人群健康的关系引起了科学家的重视。杭州地区低心血管疾病死亡率、低糖尿病发病率和相对低的高血压发病率与传统的地区烹饪之间的关系是科学家们感兴趣的研究课题之一。浙江位于中国的东海岸，浙江北部具有丰富的水资源，盛产大量的水产品。浙江东南部地区有广阔的丘陵，盛产珍贵的野味和菌类。该地区盛产十多种可食用竹笋。本文就烹饪与健康的关系、浙江 / 杭州地区的食物链以及杭州饮食在该地区居民健康和营养中的角色做了探讨。杭菜烹饪可被最好描述为“南料北烹”，即用南方的原料和北方的烹饪技艺。这种结合产生了口感滑美脆嫩、精巧细腻、简单雅致、口味独特的杭菜。杭菜中使用多种不同的绿色蔬菜，绿色蔬菜几乎伴随每一顿饭。就杭菜整体而言，它含有低饱和脂肪酸、高 ω -3多不饱和脂肪酸，加上大量使用各种植物食品，杭菜也含有多种植物化合物如维生素、抗氧化剂和微量元素，并含有丰富的纤维素和矿物质，富含这些化合物食物的搭配为该地区人民的健康提供了含有人体平衡的营养素和对人体有益的功能性植物成分。

Regional diets and associated cuisines and their contribution to overall regional nutrition are increasingly being scrutinized by scientists for their relationships to human health. The Hangzhou region in China has lower mortality rates associated with cardiovascular disease, lower incidences of diabetes mellitus and better blood pressure in the local population and the links between these lower rates of disease and the traditional regional cuisine are a source of interest. Zhejiang is located on the East Coast of China. The Northern part is well known for the extensive network of channels that produce a vast array of aquatic foods. The South West region and its extensive foothills are known for the production of rare and expensive venison and many types of fungi. The region is also known for the production of over ten different types of edible bamboos. The cuisine also involves many different types of green vegetables that accompany every meal. The best way to describe Hangzhou cuisine is the wide use of southern ingredients cooked in the typical northern manner. This combination leads to a unique taste combining the dainty and the smooth, the crisp and the tender, the simple and the elegant, the small and the exquisite. Overall the cuisine is known for its low saturated fat and high PUFA, particularly long-chain omega-3 PUFA and fibre. There is extensive use of plant based foods high in complex phytochemicals and trace elements. This combination leads to a balanced nutrition that contributes to the community health in Hangzhou.

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