



Food choices among first generation Chinese in California

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During the early and middle years of this century, nutrition educators, dietitians, and nutritionists recommended remedial diets, with little regard for ethnic or economic background of the consumer. This pattern, however, has steadily changed in recent years as health professionals providing dietary counseling have become increasingly aware of ethnic food habits.

While an abundant literature exists on the identification of characteristic ethnic foods, little research has been conducted on non-traditional elements of ethnic diet. An understanding of factors leading to the selection of nontraditional foods has important implications for nutrition educators.

A pilot project

During fall and winter 1976, we conducted a pilot project on diets of Chinese immigrants in north-central California. One hundred potential respondents were solicited from three primary sources: (1) University of California, Davis, staff, (2) university students (UC, Davis, and Sacramento State University), and (3) adult Chinese residents of Sacramento and Yolo counties. Of

100 contacted, 47 were born in China, Hong Kong, or Taiwan of Chinese parents. Of these 47 subjects, 30 cooperated with an interview and formed the basis for the present report. These individuals represented four of five Chinese districts; none was from Peking or north China and length of stay in the United States ranged from less than a year to more than 20 years. All respondents were fluent in English and that language was used in a structured interview, followed by a questionnaire that included 77 traditional Chinese and nontraditional "American" foods, all readily available in both fresh and preserved form at supermarkets or Asian specialty shops in north-central California. Foods were grouped into five categories: (1) animal products, (2) dairy items, (3) fruits, (4) vegetables, and (5) bread/cereal products. Respondents were asked frequency of consumption for each food: *often* was defined as one or more times per week, *infrequent* as at least twice a month, and *never* was considered either never tasted or eaten once and not repeated. Respondents listed frequency of consumption before and after arrival in the United

TABLE 1. Frequency of Dietary Consumption of Animal Products by Chinese Before and After Immigration to the United States (n = 30)*

| Food Item | Often | | Infrequent | | Never | |
|-----------|-------|------|------------|------|-------|------|
| | China | U.S. | China | U.S. | China | U.S. |
| Pork | 29 | 23 | 1 | 7 | 0 | 0 |
| Chicken | 27 | 27 | 3 | 3 | 0 | 0 |
| Beef | 26 | 28 | 4 | 2 | 0 | 0 |
| Prawns | 24 | 11 | 6 | 16 | 0 | 3 |
| Squid | 19 | 5 | 9 | 17 | 1 | 6 |
| Duck | 17 | 1 | 13 | 23 | 0 | 5 |
| Crab | 12 | 5 | 17 | 20 | 1 | 5 |
| Ham† | 12 | 17 | 16 | 12 | 1 | 1 |
| Oysters | 12 | 3 | 16 | 21 | 1 | 5 |
| Abalone | 7 | 3 | 20 | 21 | 2 | 5 |
| Carp | 7 | 1 | 11 | 13 | 7 | 10 |
| Shark fin | 6 | 0 | 20 | 19 | 4 | 11 |
| Snails | 3 | 0 | 15 | 6 | 11 | 23 |
| Trout | 3 | 6 | 13 | 19 | 14 | 5 |
| Hamburger | 2 | 15 | 18 | 13 | 9 | 1 |
| Frog legs | 2 | 0 | 17 | 3 | 10 | 26 |
| Eel | 2 | 0 | 16 | 7 | 11 | 22 |
| Bacon† | 2 | 9 | 14 | 16 | 12 | 2 |
| Hotdogs† | 1 | 12 | 17 | 16 | 11 | 1 |
| Snake | 0 | 1 | 10 | 2 | 19 | 26 |
| Dog | 0 | 0 | 9 | 0 | 20 | 29 |
| Rabbit | 0 | 0 | 9 | 4 | 20 | 25 |
| Deer | 0 | 0 | 7 | 8 | 22 | 21 |

*If the total responses for any one food item do not equal 30, the remaining responses were *No Response*.

†Except for dagger-marked items, all have been identified as traditional Chinese foods.

TABLE 2. Frequency of Dietary Consumption of Dairy Products by Chinese Before and After Immigration to the United States (n = 30)*

| Food Item† | Often | | Infrequent | | Never | |
|----------------|-------|------|------------|------|-------|------|
| | China | U.S. | China | U.S. | China | U.S. |
| Ice Cream | 18 | 23 | 12 | 5 | 0 | 0 |
| Butter | 10 | 10 | 13 | 10 | 1 | 1 |
| Whipping cream | 3 | 7 | 13 | 18 | 14 | 3 |
| Hard cheese | 0 | 8 | 13 | 12 | 16 | 8 |
| Yogurt | 0 | 4 | 4 | 11 | 25 | 13 |
| Cottage cheese | 0 | 1 | 3 | 13 | 26 | 14 |
| Sour cream | 0 | 1 | 3 | 12 | 26 | 14 |

*If the total responses for any one food item do not equal 30, the remaining responses were *No Response*.

†None of these items is considered traditional Chinese food.

TABLE 3. Frequency of Dietary Consumption of Cereals, Fruits, and Vegetables by Chinese Before and After Immigration to the United States (n = 30)*

| Food Item | Often | | Infrequent | | Never | |
|-----------------------|-------|------|------------|------|-------|------|
| | China | U.S. | China | U.S. | China | U.S. |
| Bread/cereal products | | | | | | |
| Rice† | 30 | 28 | 0 | 2 | 0 | 0 |
| Bread | 18 | 23 | 12 | 6 | 0 | 0 |
| Steamed bread† | 18 | 6 | 9 | 14 | 3 | 8 |
| Wheat noodles† | 18 | 10 | 6 | 11 | 5 | 6 |
| Egg noodles† | 14 | 14 | 12 | 10 | 2 | 3 |
| Hot breakfast cereal | 5 | 5 | 5 | 13 | 17 | 9 |

States. Additional data were also sought on traditional and nontraditional snacking foods and the use of beverages and desserts in meal planning.

Animal products. When comparing diets before and after respondents arrived in the United States, several trends emerge. First is a decline in diversity of animal products regularly consumed in the United States when compared with previous dietary patterns followed in China. Before arrival in America, at least 40 percent of respondents consumed the following nine foods one or more times per week: beef, chicken, crab, duck, ham, oysters, pork, prawns, and squid. After arrival in America, however, only six items fit the same category, and two are nontraditional: beef, chicken, ham, hamburger, hotdog and pork. Second, frequency of use for beef and chicken remains relatively constant in both China and America, but other foods of animal origin exhibit sharp increases or decreases in consumption frequency. One example of a sharp increase is bacon: only 6 percent reported eating bacon often in China compared with 30 percent in America. Foods of animal origin exhibiting sharp decreases primarily include seafoods (crab, oysters, prawns, shark fin, squid) and duck. All, however, are readily available at Asian food specialty shops in the Sacramento area and also may be purchased in nearby San Francisco.

Table 1 also reveals two points relative to Chinese ethnic foods. First, many Chinese ethnic foods are not typically consumed in China, as respondents reported low fre-

quencies of dietary use in China for dog, eel, frog legs, rabbit, snails, snake, and venison. Second, whereas some Chinese ethnic foods are little used in China, they nevertheless may still be used in America by immigrants despite problems of cost and reduced availability. Items fitting this category include snails, snake, and rabbit.

Dairy products. Because many Asians are lactose malabsorbers, we expected that Chinese volunteers in our study would exhibit low consumption frequencies of dairy products. Indeed, with the exception of ice cream (consumed regularly by 18 of 30 respondents in China), dairy products are not widely used. More than 50 percent of our respondents had never eaten hard cheese, cottage cheese, sour cream, or yogurt in China although such products are all available there. After immigration to America, however, more dairy products exhibited higher use frequencies when compared with dietary patterns practiced in China. Butter use remained similar in China and America. These data provide insights on changing consumption patterns but are incomplete in that information about milk use was not obtained.

Cereals. Our pilot project data suggest that macaroni and spaghetti are interchangeable as dietary items, but that Chinese perceive wheat and egg noodles as distinctly different. Steamed breads, characteristic of China, never had been consumed by at least three respondents when living in China. After immigration to America, eight respondents (27 percent) did not consume steamed breads, although these products are readily available in Sac-

ramento County. Rice remains the cereal of choice, but our data suggest that frequency of rice consumption declines after immigration, despite the ready availability of Asian specialty rices in our study area. Immigrants consume considerably more hot and cold breakfast cereals: 19 respondents (63 percent) reported never eating cold cereal in China, but only two respondents (7 percent) reported never eating it after arrival in America.

One crosscultural finding of considerable interest is that 20 respondents (67 percent) stated that they eat tortillas at least twice monthly in the United States.

Vegetables. Chinese immigrants appear to maintain a wide diversity of vegetable use after arrival in America. This diversity, however, is maintained through a different spectrum of vegetables when dietary patterns in China and America are compared. Since all vegetables itemized in table 3 are available locally in both fresh and preserved form, it is interesting to examine groupings of vegetable products whose frequency of use sharply increases, decreases, or remains constant after consumers immigrate to the United States. Consumption of broccoli, lettuce, potato, squash, and zucchini sharply increased while bok choy, green onions, lotus root, mushrooms, tree ears, and water chestnuts were consumed markedly less. Availability does not account for this decline in use, since all may be purchased locally. Vegetables whose frequency of use remained constant are bell pepper, cabbage, carrots, celery, onions, peas, and string beans. Several traditional Chinese foods—broccoli, celery, cucumber, green

Table 3, continued

| Food Item | Often | | Infrequent | | Never | |
|-----------------------|-------|------|------------|------|-------|------|
| | China | U.S. | China | U.S. | China | U.S. |
| Spaghetti | 3 | 8 | 19 | 17 | 6 | 2 |
| Macaroni | 3 | 3 | 16 | 20 | 8 | 4 |
| Pancakes | 1 | 4 | 15 | 23 | 13 | 1 |
| Cold breakfast cereal | 1 | 9 | 7 | 16 | 19 | 2 |
| Tortillas | 0 | 2 | 7 | 18 | 20 | 6 |
| Fruits | | | | | | |
| Orange | 26 | 22 | 4 | 7 | 0 | 0 |
| Banana† | 26 | 21 | 3 | 8 | 0 | 1 |
| Watermelon† | 24 | 15 | 5 | 14 | 0 | 1 |
| Mandarin orange† | 23 | 2 | 7 | 16 | 0 | 10 |
| Apple | 18 | 23 | 10 | 7 | 0 | 0 |
| Pear | 18 | 13 | 10 | 11 | 0 | 4 |
| Lychees† | 17 | 3 | 11 | 7 | 1 | 16 |
| Grapes | 14 | 15 | 15 | 13 | 0 | 0 |
| Pineapple | 14 | 4 | 13 | 22 | 2 | 3 |
| Peach | 11 | 20 | 17 | 7 | 2 | 2 |
| Honeydew melon | 11 | 13 | 12 | 16 | 4 | 1 |
| Persimmon† | 10 | 2 | 13 | 10 | 4 | 15 |
| Grapefruit | 4 | 8 | 9 | 13 | 14 | 8 |
| Vegetables | | | | | | |
| Mushrooms† | 28 | 19 | 2 | 10 | 0 | 0 |
| Bok Choy† | 28 | 16 | 1 | 11 | 0 | 1 |

Table 3, continued

| Food Item | Often | | Infrequent | | Never | |
|------------------|-------|------|------------|------|-------|------|
| | China | U.S. | China | U.S. | China | U.S. |
| Cabbage | 26 | 22 | 4 | 7 | 0 | 1 |
| Bean sprouts† | 23 | 12 | 7 | 16 | 0 | 1 |
| Green onions† | 22 | 15 | 7 | 13 | 1 | 1 |
| Pea pods† | 19 | 11 | 9 | 15 | 0 | 3 |
| Onions | 18 | 19 | 10 | 6 | 2 | 4 |
| String beans | 18 | 13 | 10 | 14 | 2 | 2 |
| Bamboo shoots† | 17 | 6 | 13 | 18 | 0 | 5 |
| Celery† | 17 | 19 | 12 | 10 | 1 | 1 |
| Cucumber | 17 | 12 | 10 | 14 | 3 | 3 |
| Carrot | 16 | 19 | 14 | 11 | 0 | 0 |
| Bell pepper | 15 | 16 | 13 | 12 | 1 | 2 |
| Lettuce | 15 | 24 | 10 | 6 | 4 | 0 |
| Eggplant | 14 | 10 | 12 | 12 | 4 | 6 |
| Broccoli | 14 | 19 | 9 | 8 | 7 | 1 |
| Peas | 13 | 16 | 15 | 14 | 1 | 0 |
| Lotus root† | 12 | 1 | 13 | 15 | 3 | 12 |
| Tree ears† | 12 | 4 | 8 | 7 | 3 | 6 |
| Water chestnuts† | 10 | 3 | 18 | 20 | 2 | 7 |
| Potato | 9 | 16 | 19 | 10 | 2 | 3 |
| Squash | 7 | 11 | 10 | 13 | 11 | 4 |
| Zucchini | 4 | 9 | 11 | 13 | 14 | 6 |

*If the total responses for any one food item do not equal 30, the remaining responses were *No Response*.

†Identified as a traditional ethnic food.

onions, lotus root, tree ears, and water chestnuts—never had been consumed by some respondents in China. Likewise, several traditional Chinese foods are not eaten by Chinese in our study area, despite their availability. Foods in this class include: bok choy, bean sprouts, bamboo shoots, lotus root, pea pods, tree ears, and water chestnuts.

Fruit. More apples and peaches are consumed in America than in China, while largest decreases are with lychee, mandarin orange, persimmon, pineapple, and watermelon. Again, decline in consumption of these foods cannot be attributed to availability because fresh, dried, and canned products are widely available at specialty shops within the study region. Examples of fruits consumed in nearly equal frequencies in China and America include banana, grape, honeydew melon, and orange. It is interesting to note that peaches—symbol of longevity in China—never had been consumed in China by at least two respondents. Furthermore, one respondent never had eaten lychees in China and four never had eaten persimmons—despite these fruits being especially associated with Chinese by Westerners—and at least 50 percent of our respondents never eat them in the United States, even though they are readily available.

Resulting questions

Our data illustrate several dietary trends in food behavior of Chinese immigrants to north-central California. First, some “characteristic” Chinese ethnic foods were not regularly consumed even in China, and such items continue to play inconsequential or

nonexistent roles once the immigrant arrives in America. Second, some frequently eaten Chinese ethnic foods are readily abandoned after the consumer arrives in America, despite the availability of these foods in fresh or preserved forms.

An explanation for the first finding may lie in rapidly occurring dietary change within China, a pattern whereby Chinese food behavior once considered correct may no longer be so. The second finding may be due to considerations of cost and perceived food quality. Although all foods itemized on the questionnaire are available to respondents, some foods may be too expensive, or might be perceived as inferior in taste, texture, or quality. (Whether such perceived differences between foods in China and America are real or psychological remains an important area for future research in sensory evaluation.) After abandoning many Chinese ethnic foods, Chinese immigrants have turned to American foods or to items characteristic of other ethnic groups, as with tortillas.

When evaluating characteristic diets of ethnic minorities after immigration, three food-use categories emerge: increased frequency, decreased frequency, and constant frequency. Whereas our data are limited, we have shown that nontraditional foods play major dietary and nutritional roles in Chinese-American families. Thus our study raises several provocative questions that remain to be answered. For example: What factors determine whether or not an individual readily adopts nontraditional foods? Why have some immigrants steadily maintained ethnic-food consumption while other groups have quickly accepted a wide range

of American food patterns? Why are some foods adopted quickly, others slowly?

The intriguing question of Asian immigrants’ wide use of tortillas requires closer investigation. On the basis of regional origin, Chinese demographic and geographic factors cannot account for rapid acceptance after immigration to America, since no respondents were from northern China where flat, tortilla-like wheat cakes are prepared. We need to understand more about the changing social significance of food as perceived by Chinese in contemporary society, whether in China or in America.

We suggest that questions raised in our study call for further detailed work not only among Asian immigrants to America but among immigrants from other countries as well. Are there universal trends? Are there nutritional dangers for immigrants who eclectically adopt quick-snacking patterns of 20th-century America, especially for individuals or families unable to maintain their traditional food patterns because of cost or availability?

Preconceived notions about ethnic food behavior may be quite erroneous, and nutrition educators need to be sharply tuned to both minority and majority food behavior. Let us not be surprised when we counsel Asians who do not eat rice, Hispanics who do not eat tacos, or American Indians of California who have never eaten acorn-flour bread. We can be better nutrition educators when we examine what our clients *actually* eat.

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Attitudes of farmers toward using crop residues as fuel

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Growers favor use of rice straw and prunings as sources of energy by utility companies, but only if the collection system is practical, timely, and reliable.

Agricultural residues—the renewable by-products of farming, lumber production, and food processing operations in the state—are now attractive alternative energy sources to oil and natural gas. Twenty-seven million tons of residue containing the equivalent energy of 65 million barrels of oil are produced each year in California. Utility power companies in California are especially interested in the potential for devel-

oping agricultural residues into a useful and stable fuel supply for electric power generation. This article deals principally with the attitudes of farmers toward the utilization of their crop residues by utilities for power generation.

In a recent study (August 1977), we explored with the Pacific Gas and Electric Company the economic and technical feasibility of using agricultural residues as fuel.

We evaluated methods and costs for collecting, transporting, and converting residues, and found energy production from residues to be competitive with that from coal, provided that utilities can establish long-term contracts with farmers for the use of residues produced on farmers’ lands. These long-term contracts are vital to both the utilities and the farmer—assuring the utilities of a firm fuel supply and the