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Comparison of Dietary Risk Factors for Cardiovascular Disease Among Different Groups of Chinese Americans

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Introduction

Cardiovascular Disease among Chinese Americans

Cardiovascular disease is the number one killer of men and women in the United States. A disease once associated with affluence, it was once more prevalent in populations with high standards of living. By 1999, however, cardiovascular disease contributed to one-third of deaths in the world, and 78% of these deaths were of people in low to middle income countries. Research has strongly evidenced that a major cause of cardiovascular disease is dietary fat, especially saturated fat (Sun and Chen 1994). Food that is high in total fat, saturated fat, and cholesterol, and has a low polyunsaturated to saturated fatty acid ratio is linked with greater levels of plasma lipids, total cholesterol, triglycerides, and LDL cholesterol, which all contribute to an increased susceptibility to cardiovascular disease.

According to the latest information from the World Health Organization (WHO) MONICA project (Monitoring Trends and Determinants in Cardiovascular Disease), in 35 populations studied around the world from the mid 1980’s to the mid 1990’s, the lowest rates of CVD for both men and women (ages 35-74) were found in Beijing. In
general, Asians have a lesser occurrence of CVD than Americans, however, CVD is currently the leading cause of death among Asian Americans. As Asians immigrate to the United States from their country of origin, the prevalence of and mortality from CVD seems to increase. For example, in one study of Chinese Americans in New York City (Sun and Chen 1994), this population had a higher level of total cholesterol than Chinese living in China.

Chinese people in China and ethnic Chinese in the United States have the same genetic background, but the population in the United States has a much greater risk for CVD. Comparison studies between the two groups are helpful in finding the causes of differences in CVD incidence. Such studies look at differences in dietary patterns, dietary knowledge, environmental factors influencing diet, and attitudes towards diet of the two groups. There is great evidence that these differences are strongly associated with higher rates of incidences of CVD as well as other chronic diseases including diabetes and cancers of the colon, breast, and prostate, among the Chinese population in the United States (Satia-Abotta et al. 2002).

A major risk factor for Chinese Americans is adopting a Western eating pattern. For example, in a study of ethnic Chinese living in Los Angeles, Vancouver, San Francisco-Oakland, Hangzhou, and Ningbo (Satia-Abotta et al. 2002), researchers found that the median percentage of energy protein and fat were 17% and 35% among Chinese who live in North America, and 9% and 20% among native Chinese. The Chinese populations in North America consumed 60% of their protein from meat and
fish and 17% of protein from rice and other grains. For the native Chinese populations, these percentages were 20% and 54%, respectively.

In studies focused on eating patterns among immigrants from Asia (Pan et al. 1999), investigators have discovered that particular traditional eating practices remained while at the same time Western foods were incorporated. Rice remained as the main staple, but cereal, bread, sandwiches, milk, and soft drinks were replacing other traditional foods. Another way to look at this is that dinner was the least changed and most traditional meal while mainly American foods were consumed for breakfast, lunch, and snacks.

Some studies have found that changes in diet among Chinese immigrants were correlated with length of time in the United States, ability to understand and communicate in English, social contact with people in the United States, and greater involvement in extracurricular activities and educational programs (Pan et al. 1999). Younger immigrants were more likely to change their eating patterns than older immigrants. Also, men were more likely to change their eating patterns than women as women had greater experience in cooking traditional meals.

**Acculturation**

Acculturation is “the process by which a racial/ethnic group, usually a minority, adopts the cultural patterns (beliefs, religion, language) of a dominant/host group” (Satia-Abouta et al. 2002). Immigrants who are highly educated, from urban areas, and have similar cultural or physical characteristics to people of the new country are the
least likely to experience cultural isolation or major lifestyle changes. They have the
greatest facility to assimilate into a new society. Immigrants who acculturate with the
least speed and facility tend to be those who live in ethnic enclaves ("geographically
close communities of people of the same ethnic group") and those who migrate
involuntarily, such as refugees.

Dietary acculturation is "the process that occurs when members of a minority group
adopt the eating patterns/food choices of the host country" (Satia-Aboua et al. 2002).
Studies about dietary acculturation typically assume that acculturation and dietary
change follow a single continuum model (Lee et al. 1999). An immigrant’s diet may be
anywhere from unacculturated to acculturated. Many immigrants are "bicultural" in
which they relinquish some of their original food habits to adopt the counterparts from
the new society. In order to identify what factors affect a person’s diet, it is important to
understand the relationship between individuals’ socioeconomic acculturation and
dietary acculturation. A system of factors influences food choices with different factors
more significant in different situations. These factors include eating environment,
market environment, health consciousness, and attitude toward ethnic food. Eating
environment comprises of household composition, size of household, meal preparation,
and the dominant society’s acceptance of ethnic foods. Market environment determines
what foods are available. For people who wish to have a more traditional diet, the
market environment greatly influences diet by allowing or limiting easy access to
traditional food items. Health consciousness is simply how concerned an individual is
about his health.
Objective

The objective of this study is to evaluate the effects of migration from China to the United States on dietary patterns which influence risk for cardiovascular disease. Heart disease is the number one killer in the United States today and is the leading cause of death for Asian Americans (Sun and Chen 1994). Changing disease patterns among the Chinese is a consequence of migration from China to the United States. Ethnic Chinese people in the United States have a higher level of total cholesterol than the Chinese living in China. These differences are due to diet, in a significant part, which strongly suggests that incorporating Western eating patterns to a diet is an important risk factor for Chinese immigrants. However, the Chinese in the United States have different dietary patterns, including different degrees of Western influence in their diet.

From this study, I hope to determine whether there are differences in diet and eating patterns based on different degrees of acculturation among ethnic Chinese living in the United States. I would like to look at what factors might be linked to specific differences in the diet and eating patterns of this population. I will particularly look at many aspects of language skills and communication of an individual and his parents, such as which language he thinks in and which language he uses in his household, and find trends between language and diet.
Methods

The principal investigator, Maggie Phan, interviewed ethnic Chinese individuals living in the United States for this study. The interviews were in English. The participants were all in good health and not dieting. They were recruited through personal contact by e-mail from the University of Pennsylvania and the Love Truth Mennonite Church in Philadelphia. Each participant was interviewed in a quiet setting (either in a study room or a room in church) for approximately twenty minutes. The interviews were semi-structured, designed to elicit how cultural and bicultural practices and beliefs affect dietary quality and food choice. This study was approved as exempt by the Institutional Review Board of the University of Pennsylvania.

At the interview, the subjects were asked two kinds of questions: questions about their background and questions about their dietary practices. Examples of background questions include at which ages the individual has been residing in the United States, how well he speaks English, and what his primary language of communication is now. Many specific questions were asked regarding the individual’s knowledge of different languages, particularly English and Chinese. The languages that an individual uses in different situations (e.g., home, with friends, work) can be very good indicators of one’s level of acculturation. Questions regarding an individual’s parents’ language skills and communication were also asked because these are also good clues to the individual’s family culture.

Questions about dietary practices ask the individuals what foods they eat, how often they eat, whether they consider nutrition, health, or food labels in their food
choices, how traditional health beliefs have affected their diet in any way, and environmental factors related to diet. In order to look for dietary risk for cardiovascular disease, it is important to study what kinds of foods are eaten, such as vegetables v. meats, self-cooked meals v. purchased meals, and traditional Chinese foods v. mainstream American food. An individual’s attitudes towards nutrition and diet are also critical to look at because these attitudes are likely to have been shaped by the individual’s family and culture, and are greatly influential in food choice. All interviews were recorded and transcribed.

Results

Cultural Background

I interviewed 26 Chinese Americans for this study (14 females). The participants’ ages ranged from 18 to 47 years (mean: 21 years). They were all in good health and not dieting. Fifteen were born in the United States. The others were born in China, Taiwan,
Hong Kong, Canada, and Cambodia. The average age of immigration of these immigrants was 10.7 years. Twenty-one participants are currently college students. Only one participant had a mother born in the United States and three had a father born in the United States. Fourteen participants live in an urban area today. Eleven live in a suburban area and one lives in a rural area. All but two subjects had Chinese American friends while growing up. The two that did not have Chinese American friends grew up in a town with less than one percent Chinese Americans. All subjects reported having Chinese American friends today, and all but one reported that their parents had Chinese American friends.

Only four participants reported that English was their only first language, although eighteen participants said that they thought in English. Three reported that English plus a Chinese dialect were their first languages. Eleven reported that Mandarin was their only first language. Four reported that Cantonese was their only first language. Four subjects reported that a language other than English or Chinese to be their first language. Five subjects said that they thought in both English and a Chinese dialect.

Six participants speak to their parents in English only while seven speak to them in English plus one of the Chinese dialects. Ten speak to their parents in one of the Chinese dialects only, and three speak to their parents in a language other than English or Chinese. Only four were required to speak Chinese at home. All but five have taken a class to learn Chinese before. Twenty-four participants speak in English outside of school and work.
All but one participant participates or used to participate in extracurricular activities. All but five have a religion. When the participants were asked how they identified themselves, nine responded “Chinese American,” seven responded “Chinese,” three responded “Taiwanese American,” two said “Asian American,” and five responded something different from the afore-mentioned.

Diet and Eating patterns

All but three of the participants ate snacks. While eleven of the participants ate fruit and/or vegetables for snacks, these were not the only snacks that they ate. Out of all 26 participants, eighteen reported to snacking on junk food (cookies, crackers, chips, cake, ice cream, candy, chocolate, candy bar).

Breakfast

Five participants do not eat breakfast. Eleven eat breakfast that includes meat, eggs, cheese, cake, pastry, or fried food. Two participants do not eat lunch. Seven include vegetables in their lunch (excluding salads, vegetables in sandwiches, and
potatoes). Seventeen have lunches that include meat, but not vegetables. All the subjects reported to eating dinner and eleven include vegetables. Thirteen of them have dinners with meat, but not vegetables. Two have neither vegetables nor meat in their dinners. When asked whether they ate dessert, five participants said "yes," eleven said "no," and ten said "sometimes."
Other questions about diet

When asked about their feelings about their current diet, only two participants said something positive about it. Eleven had something negative to say about their diet. Seven said something neutral, and six had mixed feelings about their diet.

![Feelings towards Current Diet](image)

When asked about their feelings about their current weight, only two participants were happy about it. Eleven participants responded unfavorably about their current weight with women tending to wish to lose weight and men wishing to
gain weight. Nine said that they were “OK” or neutral about their weight and four responded with mixed feelings.

Ten subjects reported that they have previously experienced negative feelings after they ate and all of these negative feelings were feelings of being too full or feelings or guilt. When asked what foods they wish they could eat more often, only two subjects reported nothing. Nine named healthy foods. Twelve named foods that they felt were delicious, but not necessarily healthy. Three named both healthy and delicious foods. One question asked whether there were any specific foods that they do not eat at all, and eleven named nothing. Only two participants named a food that they didn’t eat because they felt that it was unhealthy. Eleven named foods that they simply did not like, and one person named both kinds of foods.

When asked how often they go to a restaurant, there were a variety of answers, so I grouped the responses into four categories. Twelve participants go to a restaurant once or twice a week. Six go three or more times a week. Three go once every two
weeks. Five subjects go to the restaurant less than once every two weeks.

**Fruit consumption**

![Fruit consumption chart]

**Vegetable consumption**

![Vegetable consumption chart]

There were also a variety of responses to the questions asking how often fruits (not including juices) are consumed and how often vegetables (not including salads, vegetables inside sandwiches, and potatoes) are consumed. These responses were also grouped. Only three participants eat fruits three or more times a day. Five eat fruits twice a day. Seven eat fruits once a day. Seven eat fruits one to six times a week, and four eat fruits less than once a week. Only one participant eats vegetables three times a
day. Four eat vegetables twice a day. Eleven eat vegetables once a day. Five eat vegetables one to six times a week, and five reported that they either never or almost never eat vegetables.

Thirteen of the participants reported that they substitute lower-fat alternatives for high-fat foods. Every single one of these thirteen participants said that they used lower-fat dairy products such as skim milk or low-fat yogurt. Twenty-four of the subjects reported that a supermarket was one of the places where they purchased food and nine of these subjects also go to supermarkets that sell Asian food items. The two subjects who do not go to supermarkets rely on dining halls and food trucks.

To the question of how easy it is to adhere to what they feel is a good diet, only two responded very easy, five responded easy or relatively easy, and five responded not hard. However, seven said that it was hard or difficult and six that it was very difficult or impossible.

When asked what foods they eat when they are in a hurry, ten subjects reported food that included main meal foods (non-snacks) such as sandwiches, food truck boxes, and noodles. Five subjects named foods that included fruit, four named foods that included junk food snacks, and five eat nothing at all when in a hurry. When asked how often they eat deep-fried food, three subjects said never and five subjects said almost never or rarely. Four subjects reported eating deep-fried foods less than once a week, eleven reported once or twice a week, and three subjects reported eating deep-fried foods three or more times per week.
I asked the subjects what foods that they boil or steam, and what foods that they stir-fry. Seven subjects do not boil or steam food. Vegetables are boiled or steamed by twelve subjects, meat by two subjects, Asian dumplings by five subjects, and pasta, noodles, or rice by eleven subjects. Nine subjects do not stir-fry food. Vegetables are stir-fried by eleven subjects, meats are stir-fried by fourteen subjects, and pasta, noodles, or rice by five subjects.

Questions about exercise

Seventeen subjects reported that they exercise. Six do not exercise and three exercise occasionally. Twenty-two subjects like to exercise, three do not, and one sometimes likes to exercise. Four subjects reported exercising one to two times per week. Seven subjects reported exercising three to four times a week, and nine subjects said five to seven times per week.

Interesting trends

There were several interesting trends in breakfast, lunch, and dinner. Subjects who did not list meat, eggs, cheese, cake, pastry, and fried food for breakfast are more likely to eat meat, but not vegetables for lunch and dinner. Subjects who do not eat breakfast are more likely to have mixed feelings about their current diet. Those who have vegetables in their lunch have vegetables in their dinner and had a first language other than English. Those who had something unfavorable to say about their current
diet say that they think in English and are less likely to have vegetables for lunch and dinner.

Frequency of vegetable consumption had some notable patterns. Subjects who have a higher frequency of vegetable consumption were more likely to list fruits and vegetables as snacks, however, this is in addition to junk food as snacks. They are more likely to list vegetables for dinner, have a higher frequency of fruit consumption, and less likely to have negative feelings when they eat. In addition, these subjects were more likely to have a childhood hometown that was urban, more likely to communicate in Chinese with parents, and more likely to have an easier time with an ideal diet.

A few patterns related to frequency of going to restaurants were found. Subjects who go to restaurants at least once a week were mostly subjects who think only in English, and were more likely to say something unfavorable about their weight. Those who go to restaurants once or twice a week, but not more, were less likely to have vegetables, but have meat in their lunch and dinner.

Finally, there were a few interesting trends concerning the subjects' feelings towards their current weight. Subjects who had something unfavorable to say about their weight are more likely to eat at restaurants at least once a week and less likely to substitute for high-fat foods. Those who were neutral/OK about their weight are more likely to substitute for high-fat foods.
Discussion

As expected, factors like level of acculturation, food market environment, convenience, and language were influential in determining an individual’s diet. As twenty-one of the participants in this study are college students, many of the participants expressed convenience and a lack of time greatly factoring into their food choices. Seven of the subjects never cook at all. Eighteen of the subjects include junk food for their snacks. Twelve of the subjects reported that they wished that they could eat vegetables and fruit more often. Only thirteen subjects eat fruit at least once a day and only sixteen subjects eat vegetables at least once a day. Sandwiches and other meals containing meat, on the other hand, are highly accessible. The subjects cited how difficult it is to incorporate vegetables (not including salads or potatoes) into their diet while living in a college campus. Some do not have a kitchen or do not know how to cook, some feel that the nearest supermarket is too far away, and many feel that it is too inconvenient or no: enough time to make the effort to eat vegetables and fruit. These are also some of the reasons why some of the participants do not eat breakfast. Not surprisingly, only two participants reported being happy about their current diet while the other participants were only OK or neutral, not satisfied, or had mixed feelings about their diet.

Likewise, only two participants reported being happy with their current weight. The participants expressed a general feeling of discontent regarding their current eating patterns due to their lack of time and lack of variety of food available within a close distance. They often resorted to high-fat, convenient junk food because nothing else
was convenient. Only seven subjects feel that it is easy or very easy to adhere to a good
diet. Twelve subjects named healthy foods as foods that they wish they could eat more
often.

The subjects with the higher vegetable consumption have some interesting
characteristics. They are more likely to communicate with their parents in one of the
Chinese dialects. In fact, many of the subjects with the higher frequency of vegetable
consumption reported that their first language was not English. These reflect a strong
likelihood of being in a family that is not acculturated to American society at a high
degree as their households do not communicate primarily in English. The subjects with
the higher vegetable consumption are also less likely to have negative feelings after
eating and being dissatisfied with their current diet. These are not surprising because
they are more likely to list fruits and vegetables as snacks and following a diet that they
feel is a good diet. These particular subjects made the effort to shop at a supermarket
selling Asian food items and cook on a regular basis despite their busy schedules.

All of the thirteen subjects that said that they substitute lower-fat alternatives for
high-fat foods used lower-fat dairy products such as skim milk or low-fat yogurt. This
finding goes along with convenience. Since low-fat dairy products are available and do
not require any special preparation in supermarkets, they are very convenient so that
people are willing to make this substitution.

Like the results related to vegetable consumption, the results related to the
frequency of eating at restaurants were greatly affected by the subjects' level of
acculturation to American culture. The participants who eat at restaurants once or
more per week were mostly subjects who think only in English. These are the subjects who either do not cook at a regular basis or do not cook at all. They are likely to be from more acculturated families who speak primarily English in the household. They are also more likely to say something unfavorable about their weight, which may be due to not only their diets, but societal pressures of American cultures.

Conclusions

Although eleven of the twenty-six subjects were not born in the United States, there were no significant findings with regards to the subjects’ place of birth. This may be due to the fact that most of the subjects who immigrated to the United States came as children, and that almost all of the parents of the subjects were born outside of the United States. There were also no significant findings with regards to the subjects’ religion, the proportion of ethnic Chinese in their hometowns, how they identified themselves by ethnicity, and how much and often they exercised.

The most important finding from this study is that subjects with the highest frequency of vegetable consumption appear to be the ones with the least acculturated diets. They were more likely to cook on a regular basis, more likely to include fruits in their diets, and have characteristics of belonging to a family that has retained Chinese culture, customs, and language. They were more likely to speak in Chinese to their parents and take the time to go to a supermarket selling Asian food products so that they can prepare the kind of food that they eat in their culture. They were also the subjects with the most positive responses about their current diet and current weight.
The strongest relationship I found was a correlation between eating at restaurants and thinking only in English. I surmise that these are the subjects whose families are highly acculturated in the United States and communicate primarily in English. They reported that they either do not cook on a regular basis or do not cook at all. Those who go to restaurants once or twice a week (but not more) had the lowest frequencies of vegetable consumption and included meat in their diets for both lunch and dinner. They relied on food that was convenient and easily accessible for much of their diets.

In general, all of the participants in the interview felt that a healthy diet full of vegetables and fruits is very important, but many of them choose not to make efforts to include more vegetables and fruits in their diets. Those dissatisfied with their current diets were well aware of their dietary patterns. Many of the subjects felt that they were relegated to their current diets due to time constraints, convenience, and food availability. In conclusion, this study has found evidence that level of acculturation is related to dietary risk for cardiovascular disease. The subjects with the most characteristics of acculturation tended to have diets with greater risk for cardiovascular disease than the subjects with characteristics of retaining traditional Chinese culture. The subjects who showed the highest degree of acculturation tended to think in English, communicate primarily in English, not cook, be more concerned with their body weight, and go to restaurants on a regular basis. They included meat in their lunch and dinner regularly, but not vegetables. These were the subjects who showed the greatest dietary risk for cardiovascular disease. Those whose first language was Chinese and who
communicate in Chinese with their parents tended to include vegetables regularly into their lunch and dinner, include fruit in their diet, cook regularly, purchase food items at an Asian supermarket, and be less concerned about their weight. These were the subjects who showed the least dietary risk for cardiovascular disease.

Limitations on study

This study had used a small, non-random sample of 26 participants. Since I needed to rely on volunteers for participants, this was a sample of convenience. I recruited the participants through friends from the University of Pennsylvania and the Love Truth Mennonite Church in Philadelphia, Pennsylvania.

Acknowledgements

I would like to thank Dr. Barg and all the participants for my interview.
References


Appendix

Interview Questions

Background information

1. What is your date of birth?
2. Where were you born?
3. Where was your mother born?
4. Where was your father born?
5. How old were you when you immigrated to the United States?
6. How old were your parents when they immigrated to the United States?
7. Have you been living in the United States ever since you immigrated here?
8. How long did you live in (country)?
9. What is your household composition?
10. Where is your hometown today? Is it urban, suburban, or rural?
11. Where did you spend most of your childhood? (Was it urban, suburban, or rural?)
12. Could you approximate the proportion of Chinese Americans in your hometown?
13. Could you approximate the proportion of Chinese Americans in your former schools?
14. Did you have any Chinese American friends growing up? Do you have any Chinese American friends today?
15. Do your parents have any Chinese American friends?
16. What was your first language?
17. What languages do you know other than English? Are you able to communicate in any of these languages?

18. What language do you think in?

19. What languages do your parents know?

20. How well do your parents know English?

21. What language do you communicate with your parents?

22. What language do you communicate in outside of school and work?

23. Do your parents require that you speak Chinese at home?

24. What is your educational background?

25. Are you or were you involved in any extracurricular activities? What kind?

26. Do you have a religious affiliation? If yes, what religion?

27. Have you ever taken classes to learn Chinese? If yes, why?

28. Do you feel that it is important or essential for Chinese Americans to know how to speak Chinese?

29. How do you identify yourself (Chinese, American, Chinese American, etc.)?

General questions about diet

1. Do you eat breakfast?

2. Do you eat lunch?

3. Do you eat dinner?

4. What snacks do you eat?

5. How many times a day do you eat? How many are full meals?
6. Who buys your food?

7. Who prepares your meals?

8. What kinds of foods and beverages do you normally have for breakfast?

9. What kinds of foods and beverages do you normally have for lunch?

10. What kinds of foods and beverages do you normally have for dinner?

11. Do you eat dessert after a meal? Which meals? What kinds of dessert?

12. What are your favorite foods?

13. How do you feel about your current diet?

Questions about exercise

14. Do you exercise?

15. Do you like to exercise?

16. How often do you exercise per week?

17. How long is each session of exercising?

Questions about weight

18. How do you feel about your current weight?

19. Do you ever experience any negative feelings after you eat (such as guilt, regret, worry, discomfort)?
Other questions

20. Where do you and the person who prepares your meals normally purchase food items and beverages?

21. Do you read nutrition labels when you purchase foods at the supermarket/grocery store? If not, are you aware of them?

22. Is cost a factor in deciding whether to purchase a food item?

23. What foods do you eat when you are in a hurry?

24. What foods do you wish you could eat more often?

25. Are there any specific foods that you do not eat at all?

26. How often do you go out to a restaurant to eat? Which restaurants?

27. Do you take dietary supplements such as vitamins?

28. Not counting juices, how often do you eat fruit, such as an apple, a pear, or a banana per day?

29. Not counting salads and potatoes, how often do you eat vegetables per day?

Questions about fat

30. What foods do you boil or steam?

31. What foods do you stir-fry?

32. Which of the following condiments and foods do you add to your meals: salt, pepper, dressing, sauce, mayonnaise, ketchup, butter, and gravy?

33. How do you usually prepare and cook meat and poultry?

34. Do you use butter, margarine, or oil when you cook? (If oil, which type of oil?)
35. What deep-fried foods do you eat, if any? How often?

36. Do you substitute lower-fat alternatives for high-fat foods (such as margarine for butter)?

37. What things do you do to your food to lower its fat content, if any?

Opinion questions

38. What do you think is a good diet for you?

39. How easy is it to adhere to a diet like that?

40. When you are choosing foods, what qualities do you look for?

41. How important to you is it to consume a diet high in fruits and vegetables?