FOOD HABITS, HEALTH KNOWLEDGE, AND DIETARY CHANGES AMONG TAIWANESE STUDENTS IN OKLAHOMA

BY

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CHAPTER I

INTRODUCTION

In understanding human culture, food plays an important role for its varied meanings. The roles played by foods may be sociological, psychological, or physiological, however, it is always defined culturally. Through an individual's culture a person perceives his food. Food may be regarded as edible by one society but inedible by another. Thus, the cultural factor is significantly expressed in the symbolic aspect of foods and the individuals' dietary habits (Rozin et al., 1986; Calkins, 1986; DeGarine, 1972; Fathauer, 1960). Culture is often used as a divider in relating food variables. Food habits may be used as an important criterion in this connection.

Robinson and Lawler (1977) state that food habits are derived from a person's earliest experiences. Food habits are also the result of a person's present environment and past history. Yang (1978) points out that, food habits are the result of personal, social, cultural, psychological, religious and economic influences. "In most societies, food is the focus of emotional associations, a channel for interpersonal relations, for the communication of love or discrimination or disapproval; it usually has a symbolic reference" (Fathauer, 1960, p.336). It is apparent that food habits become "quite deeply imbedded in the personalities of people raised in a particular cultural pattern" (Fathauer,

1960, p.336). Food habits, however, are not at all necessarily homogeneous within the same culture. There are different food habits for different social situations in the same food style.

People eat differently in different social classes or occupations. People on festive occasions, in mourning, or on daily diets eat differently. Also, different religious sects have different eating styles (Chang, 1977). Almost all religions of the world have certain rituals involving special food patterns. Identifying these differences, explaining them, and relating them to other social life is an important task. Thus, food habits can be laid out in a time perspective. We can see how these habits change and seek to find the reasons and consequences. These observations provide a purpose for the beginning of a theoretical and methodological framework for this study of food habits, health knowledge and dietary changes among Taiwanese students in Oklahoma.

Statement of the Problem and Justification

Anthropologists have directed the attention to the cultural meanings of foods and show that food habits play a vital part in any culture. Foodways change may occur, however, for individuals or new ethnic groups arriving in a new country (Story and Harris, 1989). What is of importance is that people move to a different country, make a cultural transition, and are unable to obtain the foods they have been accustomed to, so they may make unsatisfactory substitutions nutritionally for foods. Differences in both customs and food production capabilities may influence the foods they eat. Although

certain traditional practices are retained intact, some new foods and food use strategies will be adopted (Grivetti and Paquette, 1978).

The U.S. is host to one of the largest populations of international students, scholars, and researchers. It was estimated that there were 449,749 international students studying in the U.S. in 1994 (Tseng, 1995). The number of international students in the colleges of the U.S. continues to rise, and although, the goal is mainly to pursue academic achievement, the international students will have to accommodate to American customs to some extent. These students may make adjustments to prevailing cultural patterns. One adjustment to a new environment is dietary (Ho et al., 1966). It has been shown that, most of the new immigrants and international students living in America, due to traditional foods and eating ways of the past, may have a cultural shock in their dining experiences (Story and Harris, 1989). A number of studies concerning immigrants' food habits have been reported, however, very few studies have been conducted to examine dietary habits and food practices of international students in the colleges of the United States, and no reports have focused on Taiwanese students. There are currently more than 35,000 Taiwanese students studying in the U.S. The number rose from 2,637 in the 1950 academic year to 37,580 in the 1995 academic year, an increase of 10.3 times. This represents about 8.36 percent of the total enrollment of international students in the U.S. The students from Taiwan are only less than those of from mainland China and Japan (Tseng, 1995). The intent of this study was to demonstrate how Taiwanese students in two different cultures change their food habits in order to accommodate the new environment, and to what extent do they maintain strong ties to their native foods and

traditional diets. The results of this study may provide the public some information about the dietary habits of Taiwanese students living in the U.S. and at the same time assist them in adjusting better to the American way of eating. In addition, information from this research could be used to prepare educational materials regarding healthy eating patterns for Taiwanese students enrolled in Oklahoma universities and other U.S. universities in the future.

Purposes and Objectives

The purpose of this study was twofold:

1. To discuss the cultural background and food practices of Taiwanese students, and obtain in-depth information about changes in food habits while living in the U.S. Food intake and practices in the native country and in the U.S. will be compared, while preferences and adoption of American foods will be assessed.

2. To investigate the interrelationships among the subjects' demographic characteristics and their food preferences, health knowledge, western-style food experiences, food buying practices, frequency of consumption of selected foods, quantitative changes of food consumption, and 24-hour dietary recall. Demographic variables studied include gender, age, major, education level, marital status, number of family members in household, length of time in the U.S., place of residence, and where food is usually consumed.

Specific objectives are to determine:

1. If selected demographic variables of Taiwanese students are associated with food preferences.

2. If selected demographic variables of Taiwanese students are associated with health knowledge.

3. If selected demographic variables of Taiwanese students are associated with western-style food experiences.

4. If selected demographic variables of Taiwanese students are associated with food buying practices.

5. If selected demographic variables of Taiwanese students are associated with frequency of dietary consumption of selected foods in the U.S.

6. If selected demographic variables of Taiwanese students are associated with quantitative changes of food consumption.

7. If selected demographic variables of Taiwanese students are associated with 24-hour dietary recall.

8. If knowledge of the USDA Food Guide Pyramid of Taiwanese students are associated with 24-hour dietary recall.

Hypotheses

H1 - There will be no significant association between food preferences of Taiwanese students in Oklahoma and the selected demographic variables:

1. gender

2. age

3. major

4. education level

5. marital status

6. number of family members in household

7. length of time in the U.S.

8. place of residence

9. where food is usually consumed

H2 - There will be no significant association between health knowledge of Taiwanese students in Oklahoma and selected demographic variables as listed in H1.

H3 - There will be no significant association between western-style food experiences of Taiwanese students in Oklahoma and selected demographic variables as listed in H1.

H4 - There will be no significant association between food buying practices of Taiwanese students in Oklahoma and selected demographic variables as listed in H1.

H5 - There will be no significant association between frequency of food consumption of Taiwanese students in Oklahoma and selected demographic variables as listed in H1.

H6 - There will be no significant association between quantitative changes of food consumption of Taiwanese students in Oklahoma and selected demographic variables as listed in H1.

H7 - There will be no significant association between 24-hour dietary recall of Taiwanese students in Oklahoma and selected demographic variables as listed in H1.

H8 - There will be no significant association between knowledge of the USDA Food Guide Pyramid and 24-hour dietary recall of Taiwanese students in Oklahoma.

Assumptions and Limitations

The following assumptions were accepted for this study:

1. Due to traditional foods and eating ways of the past, there is a cultural shock faced by respondents.

2. All Taiwanese students in the research sample completed the questionnaire without any difficulty.

3. The 24-hour dietary recall was a valid method for assessing the association of food intake and knowledge of the USDA Food Guide Pyramid of the respondents.

4. The food intake of the respondents is typical of the food patterns of Taiwanese students in Oklahoma.

5. The implications of the findings could be applicable to all Taiwanese students in Oklahoma.

Two limitations identified in this study were:

1. The sample will not include new students enrolled during fall semester, 1995.

2. The sample encompassed only members of Chinese Student Association (Taiwan) at Oklahoma State University, University of Oklahoma, University of Central

Oklahoma, and Oklahoma City University listed in the spring 1995 student directories. Results from the study can therefore only be generalized to these groups of Taiwanese students.

Definition of Terms

The following terms referred to throughout the study are defined and used as follows:

1. Culture: "It consists of values, attitudes, habits, and customs that are acquired by learning" (Fathauer, 1960, p.336).
2. Food habits: The way in which individuals or groups of individuals, in response to social and cultural pressures, select, consume and utilize portions of the available food supply. "Food habits derived from man's earliest experiences and influenced by his family as well as by the social, economic, geographic, ethnic, and religious environment" (Robinson and Lawler, 1977, p.215).
3. Health knowledge: A state of awareness and understanding of nutrition gained through study and learning experiences.

CHAPTER II

REVIEW OF LITERATURE

The need for expanded research in the area of food habits established the basis for this study. This chapter will review the following major topics: (1) food and the establishment of food habits, (2) social and cultural aspects of food habits, (3) food, eating, and dietary habits in Taiwan, and (4) guides to healthful diets.

Food and The Establishment of Food Habits

The Meanings of Food

> "For some people, food is not just fuel for the body's motor or a collection of biochemicals needed to maintain existence. Food does not only sustain their life, it physically constitutes their bodies. As far as they are concerned, they are food" (MacClancy, 1993, p.24).

Food is one of the first things that is necessary and influential in survival and well-being when we come into the world. The roles played by foods may be sociological, psychological or physiological. Food, from cultivation to consumption, provides the main link between humankind and the natural environment (Goodman and Redclift, 1991).

While the basic function of food is to satisfy hunger or for physiological purpose, food has other uses, such as obtaining security, gaining status, alleviating tension, and influencing the behavior of others. It is not only essential for both the body and the spirit, but food is looked upon as a symbol of interpersonal acceptance, friendliness, sociability, or warmth (Williams, 1977). McKenzie (1986) states that food choice demonstrates group acceptance, conformity, and prestige. Food, is also as a comprehensive medium for structural and symbolic communication (Khare and Rao, 1986; Hartog and Staveren, 1985; Chang, 1977). This symbolic undertone can be perceived throughout all societies. In addition, food shows several interrelated social functions in society, such as gastronomic function, means of cultural identity, religious function, expressions of economic wealth and status, and means to exercise influence and power (Hartog and Staveren, 1985). To state succinctly, every society uses food in many ways, including all of the following (Leininger, 1970, p.153-179):

1. For nutrition;
2. To "initiate and maintain interpersonal relationships";
3. To "determine the nature and extent of interpersonal distance between people";
4. For "expression of socio-religious ideas";
5. For "social status, social prestige, and for special individual and group achievements";
6. To "help cope with man's psychological needs and stress";
7. To "reward, punish, or influence the behavior of others";
8. To "influence the political and economic status of a group"; and
9. To "detect, treat, and prevent social, physical and cultural behavior deviations and

illness manifestations".

The Establishment of Food Habits

Food habits represent a colorful personal history. Human beings from the time of birth are influenced in what they eat. The cues of what is proper to eat and what is an acceptable manner of eating are learned very early. "Children are trained for desirable food habits when, during eating, they are comfortable physically and psychologically, when they can achieve success step by step, and when friendly adults communicate their good feeling about eating a desirable diet" (Lowenberg et al., 1974, p.268).

With the symbolic meanings and social functions, foods patterns are passed on through the training of the children so that each one knows what is considered to be food and what is not. Obviously, children learn a lot about foods at meal time. Family mealtimes are a privileged occasion for parents to teach their children the rules and manners of their society or subculture (MacClancy, 1993). Parents not only influence their children's meal patterns and these patterns are passed on to succeeding generations, but inform their children what foods are desirable and how to eat them. Children learn different kinds of food and their effect on health and well-being, other characteristics of the food and what kinds of food are suitable for individuals. Lowenberg et al. (1974) believe that children do not form fixed food habits, but they may be patterned by adults to eat certain foods and not others.

Food, moreover, is one of the basic media through which attitudes and sentiments are communicated to children. The family meal situation is an important event in producing a sense of unity. Certain foods eaten early in life become associated with these family sentiments and eating together becomes a major value in some society. The food habits, therefore, established in youth are maintained in adult life. The habits become deeply imbedded in the personalities of people reared in a particular cultural pattern and the family unit plays an important role in the development of food habits (Rozin et al., 1986; DeGarine, 1972).

Social and Cultural Aspects of Food Habits

Culture Aspects on Dietary Choices

In analyzing the food behavior, three motivating factors are very significant: nutritional, psychosensory (appetite), and symbolic (cultural and social). Cultural determinants of eating behavior operate broadly (Booth, 1994). It is difficult to attribute to anything other than an "intrinsic coherence" when one surveys the symbolic and cultural representations involved in human food habits (Harris, 1985, p.15). The cultural factor is expressed in the symbolic aspect of foods and individuals' food habits (Rozin et al., 1986; Calkins, 1986; DeGarine, 1972; Lee, 1967; Fathauer, 1960). Culture consists of values, attitudes, habits, and customs that are achieved by learning. The learning begins with the earliest experiences of the child. The influence of the cultural heritage on

the human being occurs very early in life. Through culture, a person perceives his food and the world. There are certain typical similarities in all cultures, however, they may vary greatly from one to another. The meaning that a food is given by a society depends generally on the individuals' experiences and thus the drive toward the same food is exactly different in different societies (Hartog and Staveren, 1985; Gifft, 1972). In the Middle East, bread is truly the stuff of life. Without bread, a meal is impossible because the bread is the meal and all food is only an accompaniment. Satiety is attained by bread. In Mexico, since no child can live through the first 20 days without corn, corn is vital for a meaningful life (Lee, 1967). Rice is no doubt the security food for Chinese and Japanese, while milk might be the security food for most Americans.

Besides the scientific classification of foods, each society has traditional ways to classify for foods. In Philippine communities, foods are classified in three categories: foods to relieve one's hunger, such as rice; foods to satisfy appetite, such as meat and green leafy vegetables; and to taste, such as salt and pepper (Hartog and Staveren, 1985). Specific food preferences and avoidances are found in one culture and not in another because "foodways are accidents of history which express or convey messages derived from essential values or inexplicable religious beliefs" (Harris, 1985, p.14). Hartog and Staveren (1985) also state that food avoidances serve to show differences in various groups and as cultural identity.

Generally, individuals tend to adopt the food habits which are practiced by the social group to which they belong (DeGarine, 1972). Each culture has its food acceptability and their particular cuisine become a statement of the identity of their

distinctiveness as a culture (Barker, 1982). They are desirable for comfort and familiarity in eating and many people are reluctant to try new foods (Rozin et al., 1986). Each culture, therefore, has its own interpretation of the disciplines of food habits and makes studies of these habits that are necessary to know what these interpretations are. In considering an individual's response to the food he eats and his ideas and beliefs establish what types of food he will serve and how it will be cooked, culture has to be taken into account again.

Social Aspects of Food Habits in Society

Food is a medium of social exchange in many cultures. The food performs significant social functions and has a strong social influence (Rozin, 1993; Hartog and Staveren, 1985; Lee, 1967). One of the apparent function of food is its being a symbol of sociability, friendliness, warmth, and social acceptance (Williams, 1977). For the upward social parts of the population, foods which are purchased or served are attributed to social status. High prestige foods are usually served (Lowenberg, 1970). The eating pattern of individual is also influenced by social status. Person with better diets tend to come from the high social status classification (Hinton, 1962). The eating of white bread was the privilege of the rich in Europe while the poorer classes ate brown bread (Hartog and Staveren, 1985).

Likewise, food has social prestige values (Sanjur, 1982). Barker (1982) states that a food's prestige is a measure of the position of the food in a hierarchy relative to

society's values. People may be motivated to consume prestigious foods rather than consume foods that are good for health. They tend to consume foods of the social group to which they aspire, and the prestige foods become the very important attribute to "vertical mobility" (Barker, 1982, p.145). Moreover, prestigious foods are also served to illustrious members of the community at special occasions (Booth, 1994; Fieldhouse, 1986; Sanjur, 1982; Fewster et al., 1973; Lowenberg, 1970). In addition, in many cultures, food has a strong social and religious significance. The best examples of links between food and religion are pork in the Near East and beef in India. In Islam, eating is considered to be a matter of worship of God (Barker, 1982).

Food, Eating, and Dietary Habits in Taiwan

Ethnics and Religions

Located off the southeastern coast of mainland Asia, the island of Taiwan has developed into a major economic power. In the late 1990s, Taiwan's population was 21 million. The largest group of people in Taiwan is of Chinese ancestry who emigrated from the southern Chinese provinces of Fujian and Guangdong over several centuries. The second large group is people who arrived on the island from mainland China after 1949, and constitute about 18 percent of Taiwan's population (Yu, 1989). The smallest group--sometimes called aborigines, are descendants of the island's original inhabitants.

Nearly all of the residents in Taiwan have a shared cultural identity, including strong family loyalties and similar religious ties.

The predominant religions in Taiwan are Buddhism and Daoism (also spelled Taoism). Compassion, serenity, and kindness to others are highly regarded principles in Buddhism. It also encourages meditation as a way of attaining inner peace. Daoism emphasizes a simple lifestyle, a release from social obligations, and rejection of greed and desire (Yu, 1989).

The Central Role and Perceptions of Food in Chinese Life

"The Chinese consider eating food to be one of the rare joys of living, one to which they are more devoted than to religion or the pursuit of knowledge" (Simoons, 1991, p.13) "To the people, food is Heaven" is a common saying in Taiwan. From the Chinese point of view, the enjoyment of food is one of pleasure and cooking is more than a necessity to the Chinese. Chinese not only are wide-ranging in the choices of foods but concern with the excellence of food is found in all segments of society and is reflected in the common greeting "Have you eaten already?". Chinese everyday speech shows the primacy of eating in the culture: "Have you eaten?" is used for "How are you?"; "What mode do you eat?" for "What work do you do?"; "eat tightness" means "to be hardpressed"; and "eat bitterness" means "to suffer hardship" (Kwok, 1991, p. 48). Food,

therefore, plays a very important role in Chinese culture. Eating permeates and dominates Chinese life.

Principal to any consideration of Chinese views of food is the distinction between *fan* and *ts'ai*. *Fan* means "rice" or "cooked rice", and *ts'ai* means "vegetables". In a broader meaning, however, *fan* includes all cereal and starchy dishes, such as bread, porridge ,and noodles, while *ts'ai* refers to the side dishes made of meat, vegetables, poultry, or fish and accompanies *fan* and makes it palatable. The Chinese philosophy of food is that *ts'ai* are for the purpose of assisting the intake of bowls of *fan*. Children are taught the philosophy very early in life. The Chinese believe that the amount of both *fan* and *ts'ai* should be consumed appropriately at a meal otherwise it would lack balance and affect health (Simoons, 1991).

In the Chinese view, the bodily functions follow the *yin-yang* principles. The two opposing forces interact with one another to maintain balance and harmony (Ma, 1995; Simoons, 1991; Chang, 1977). When *yin* and *yang* are not balance in body may result in health problem and cause illness. Chinese began to use "*hot*" or "*cold*" foods ("*yin*" and "*yang*") about from the fourth century B.C. and it is still a dominant concept in Chinese culture (Simoons, 1991). *Yin* represents "cooling, dark and feminine" aspect, whereas *yang* represents "heating, light, and masculine" aspect (Simoons, 1991, p.22). Food can be classified as either *yin* or *yang* according to their heating or cooling effect on the body. Those foods that will yield in feeling of warmth all over the body are "*yang*" or "*hot*" foods, for example, ginger, liver, beef, chicken, eggs, wine, coffee, nuts, oily and fried foods. "*Ying*" or "*cold*" foods are those which will yield a cooling feeling or result in

secreting cold sweat. Most vegetables and fruits are classified as cold foods, such as bananas, watermelons, seaweed, cold drinks, and juices (Ma, 1995; Yang, 1978; Chang, 1977). Lichee and longan are classified as very hot fruits. In general, meat, herbal and alcoholic drinks are hot foods, fish and rice are neutral, and vegetables and fruits are cold foods (Tan and Wheeler, 1983).

The Chinese believe that an imbalance between "*yin*" and "*yang*" can bring ill-health and disease. Persons with too much *yin* are lacking in energy, may feel chills and get cold ailments or diseases. People with too much *yang* lead to fever and the risk of hot ailments or diseases. To maintain equilibrium, an individual whose body base is on the cold side of health and with too much *yin* needs to avoid excessive amounts of cold foods, and thus consumption of hot foods is one way of regaining equilibrium (Simoons, 1991; Tan and Wheeler, 1983). Essential in maintaining one's diet, the selection of the right food depending upon one's health is a critical matter for most Chinese. Even in ancient times, the Chinese have always believed in importance of food in preventing and curing illness or diseases. Food, therefore, is also medicine.

Traditional Taiwanese Food Habits

Chinese foods certainly have variety and it is a complex business to characterize the Chinese palate. The pursuit of color, flavor, and taste, which in Chinese is *se*, *hsiang*, and *wei*, is the only few thoughts on the Chinese way of eating. The art of its preparation and the way of its enjoyment is the distinct food culture in Taiwan.

The most highly regarded grain that the Taiwanese believe it to be a perfect food or even the only important food is rice. Because rice is produced more readily in southern China and Taiwan, it is the major staple food in these regions, while wheat production is common in northern China. Rice plays an essential and important role in Taiwanese daily life that there are two sayings spread far and wide: "a meal without rice is like a beautiful woman with only one eye", and children are told by adults that "every grain of rice left in bowl, there will be a pockmark on the face of future spouse" (Warner, 1994, p.9). In Taiwan, rice not only is being served as a main dish, but it can be ground in water into a flour used for making a variety of rice cakes, rice noodles, wrappings, and sweets.

Other foods general use are: soybean products, eggs, several varieties of cabbage, leafy greens, Chinese sausage, and noodle. Taiwanese consume a large amounts of soybean products, such as soybean milk, beancurd, and fried beancurd puff. The chief animal foods are pork and chicken. Seafoods are also popular and common foods, while beef is used in a small amounts. The consumption of beef is discouraged in Buddhism. In Taiwan, the elderly believe that cattle can perform many vital services for human beings so a number of Taiwanese do not eat beef. Almost, every part of edible animals is used for food, for instance, liver, kidneys, stomach, intestines, and feet. Dairy products, however, have never been a part of the Chinese diet because some elderly believe that milk is considered food for babies and children only. Currently, dairy products, especially milk, are encouraged to be consumed everyday. According to Barer-Stein (1981), lactose intolerance is one of reasons for not drinking milk. Most Asian people

stop to produce the enzyme lactose at the age of six or a little older. Thus, they can not digest lactose (Anderson, 1988). Absence of dairy products in the daily diet may cause calcium deficiency. Thus, the Taiwanese consume large amounts of tofu to obtain calcium.

In Taiwan, a meal is a common occasion for getting together with family, relatives, or friends. Taiwanese come alive when a tableful of dishes is spread in front of them. This is the moment of high sociability and conviviality. The typical Taiwanese dining table is round. Unlike the western custom of serving food individually, Chinese meals are served communally. When dining, the *ts'ai* dishes (side dishes made of meat, vegetables, fish, or poultry) are placed in big plates and hot soup is served in a big bowl in the center of table for everyone sharing and each diner is furnished with a bowl of *fan* (cooked rice), a pair of chopsticks and a spoon. The traditional Taiwanese daily meal pattern consists of breakfast, lunch, and dinner. The breakfast includes a bowl of porridge served with pickles or salty side dishes and it also can be Chinese croissants, a sweet or salty rice ball made of sticky rice, and baked wheat cakes along with soybean milk. Lunch includes rice served with side dishes consisting of meat, vegetables, fish, or poultry. Lunch also can be a bowl of noodles in soup, fried rice or fried noodles mixed with bits of meat and vegetables. Dinner is the main meal of a day, therefore, in addition to rice and soup, it includes more side dishes than those of in lunch. In general, a typical dinner for a family consists of rice, soup, three or four side dishes.

For the preparation of side dishes, the use of multiple ingredients and the mixing of flavors are the rules. Meat and vegetables are usually chopped, sliced, or diced and

combined with various spices to produce vastly different color. flavor and taste (Chang, 1977). The basic flavor principle in Taiwanese cuisine is the combination of soy sauce. rice wine, and ginger root. It forms a classic and fundamental seasoning sauce used widely throughout Taiwan. The cooking methods are usually boiled, steamed or stir-fried. The most famous Chinese cooking method is stir-frying which ingredients are cut small or thin and stirred rapidly in hot oil (Anderson, 1988). The most popular cooking oil used in Taiwan is peanut oil because of its special fragrance. Lard is still used by some households in cooking.

Vegetables and fruits are abundant and diverse. Vegetables are usually stir-fried, steamed or added to soup just minutes before serving. They are seldom eaten raw. Hot soup is necessary in meals. It is served in every lunch and dinner. It's made from pork, pork bones, vegetables, or seafoods. Taiwanese do not drink water with their meals. They usually drink hot tea after meal rather than with the meal. The variety of tea includes green tea, black tea, and other Chinese teas. There are many kinds of Chinese teas, each with a fancy name and often associated with a particular locality. The finest teas are generally considered to be the Lungching tea of Fujian and Oolong tea of northern Taiwan. Elderly Taiwanese do not drink cold beverages but young people love juice and carbonated drinks. Alcoholic beverages or wine is served with the meal in small cups on festive occasions or when guests are present. Generally speaking, consumption of wine or beer is popular for adults. Consumption of snacks is also common for most of the Taiwanese. Snacks include a wide of variety of hot or cold

foods, such as red or green beans with sweet soup, oyster noodle, stinking beancurd, and hot baked sweet potatoes.

On the whole, since western cultures are welcome and western foods are available, the food consumption patterns of the Taiwanese are changing gradually. Western foods have now become an accepted part of the Taiwanese diet.

Guides to Healthful Diets

The USDA Food Guide Pyramid

Eating a variety of foods in moderate amounts is the key to balancing healthful food choices. The U.S. Department of Agriculture's "Food Guide Pyramid" is a visual outline of what to eat each day according to the government's Dietary Guidelines (Appendix C). It is a general guide based on foods Americans eat, what nutrients are in these foods, and how individuals can choose healthful diets that is right for them. It allows individuals to adopt foods that will give required nutrients without too many calories, fat, saturated fat, cholesterol, sugar, sodium, or alcohol (Byers et al., 1994). We can use the Food Guide Pyramid to select a variety of foods from five different groups. The guide to daily food choices includes:

(1) 6-11 servings of bread, cereal, rice, and pasta group,

(2) 2-3 servings of meat, poultry, fish, and eggs group,

(3) 2-3 servings of milk, yogurt, and cheese group,

(4) 3-5 servings of vegetable group.

(5) 2-4 servings of fruit group.

(6) Use sparingly fats, oils, and sweets.

The serving sizes of each food recommended in the USDA Food Guide Pyramid are as follows (Malloy, 1993):

(1) Bread, cereals, rice, and pasta: 1 slice of bread or 1 dinner roll, 1 ounce of ready-to-eat cereal, and 1/2 cup of cooked cereal, rice, or pasta.

(2) Meat, poultry, fish, and eggs: 2-3 ounces of cooked lean boneless meat, poultry, or fish, and 1 egg. A 3-ounce piece of meat is about the size of an hamburger.

(3) Milk, yogurt, and cheese: 1 cup of milk or yogurt, 1.5 ounces of natural cheese, and 2 ounces of process cheese.

(4) Vegetables: 1 cup of raw leafy vegetables, 1/2 cup of other vegetables, cooked or chopped raw, and 3/4 cup of vegetable juice.

(5) Fruits: 1 medium apple, banana, or orange, 1/2 cup of chopped, cooked, or canned fruit, and 3/4 cup of fruit juice.

The Taiwan Healthy Food Guide

The "Healthy Food Guide" was developed by the National Health Administration of Taiwan. From the guide of healthy eating, most essential nutrients can be obtained by eating foods from the four major food groups, namely, (1) rice and cereals, (2) meat, poultry, fish, egg, milk and milk products, (3) vegetables, and (4) fruits. A balanced diet

to maintain health consists of a wide variety of foods found in the four major food groups, provided that appropriate amounts and proportion of foods are eaten regularly. The guide makes the following recommendations for daily food choices (Handbook of National Nutritional Guidelines, 1991):

(1) 3-6 bowls or 6-12 servings of rice and cereals,

(2) 5 servings of meat, poultry, fish, eggs, milk and milk products,

(3) 3-4 servings of vegetables,

(4) 2 servings of fruits,

(5) Use sparingly fats, oils, and sweets.

The serving sizes of each food recommended in Taiwan's Healthy Food Guide are as follows (Handbook of National Nutritional Guidelines, 1991):

(1) Bread, cereals, rice, and pasta: 1 slice of bread, 1/2 cup (240 cm^3) of cereals, cooked rice or noodle.

(2) Meat, poultry, fish, and eggs: 30g of cooked lean meat, poultry, or fish, 1 egg, 1 cup of milk and yogurt, and 1.5 cup of ice cream.

(3) Vegetables: 1 bowl (240 cm^3) of raw leafy vegetables or 75g cooked vegetables, 1/2 cup of fresh, frozen, or canned vegetables, and 1/2 cup of vegetable juice.

(4) Fruits: 1/2 cup of fresh, frozen, or canned fruits, 1/2 cup of chopped fruits, 1/2 cup of fruit juice, 1 medium size of orange or apple, and 1 medium slice of melon.

CHAPTER III

METHODS AND PROCEDURES

A number of studies concerning immigrants' food habits have been reported, however, very limited studies have been conducted to survey dietary habits and food intakes of international students in the U.S. colleges, specifically for Taiwanese students. According to Story and Harris (1989), foodways change may occur for individuals arriving in a new country. Differences in customs and food production capabilities may influence the foods they eat.

The purpose of this study was to examine and explore the food habits, health knowledge, and dietary changes of Taiwanese students living in Oklahoma. Specifically, these students were asked to describe frequency of consumption of selected foods in the U.S., quantitative changes of food consumption since coming to the U.S., 24-hour dietary recall, number of servings consumed daily of foods based on the USDA Food Guide Pyramid, and how well they like American foods. The research design; sample/population; data collection which includes planning and development, instrumentation, procedure, and scoring; and data analysis will be presented in this chapter.

Research Design

The research design used in this study was descriptive research which is an effective way to obtain information relevant to some preceding event that has affected a present condition (Best, 1981). One of the two classifications of descriptive research is survey research which may be used to describe, analyze, and interpret conditions that exists. It involves comparison or contrast and is useful for establishing associations among variables (Best, 1981). Survey research can also provide baseline data about the prevalence of a condition or factor of interest in the population (Monsen, 1992). In addition, it often provides clues for further study.

Survey research typically applies questionnaires and / or interviews to determine the opinions, attitudes, preferences, and perceptions of interest to the researcher. Defined by Berdie (1986), as a "series of predetermined questions", a questionnaire can provide important information about behaviors, attitudes, beliefs, and characteristics of populations. Survey is used to collect basic descriptive information from an extensive sample, while the interview could be used to follow up the questionnaire responses thoroughly for a smaller sample (Borg, 1987).

Population and Sample

The population used in the study comprised of members of the Chinese Student Associations (Taiwan, CSA) at Oklahoma State University, University of Oklahoma,

University of Central Oklahoma, and Oklahoma City University listed in the spring 1995 student directories. The list of Taiwanese students (N=582) was obtained from officers of the CSA (Taiwan) from each of the universities. The research sample only included students in the directories and excluded new students enrolling during fall semester, 1995. The research questionnaires (N=582) were mailed to all Taiwanese students at Oklahoma State University (N=76), University of Oklahoma (N=121), University of Central Oklahoma (N=190), and Oklahoma City University (N=195). Generalization of results will be limited to this group of Taiwanese students.

Data Collection

Planning and Development

Planning and development began during the spring of 1995 and continued through the fall semester of the same year. Data collection procedures were determined and data analysis techniques appropriate to test the research hypotheses were selected at the same time.

Instrumentation

The development of the research questionnaire "Food Habits, Health Knowledge and Dietary Changes among Taiwanese Students in Oklahoma" was designed by the

researcher based on relevant research literature regarding cultural food heritage, food habits and eating behaviors. Most questions used a multiple choice style format to allow more conclusive answers and easier statistical analysis. Content validity, clarity, and format were examined by the researcher's graduate committee during the research proposal meeting. Suggestions were then incorporated into the questionnaire.

The questionnaire consisted of three sections. Section one asked participants to provide their personal information and to complete the questions regarding health knowledge, western-style food experiences, food buying practices, American food preferences, health condition, weight, and dietary habits change since coming to the U.S. Basic personal background data were obtained including gender, age, major, education level, marital status, number of family members he/she lives with, years in the U.S., place of residence, and where food is usually consumed. Section two asked participants' preferences for specific American foods (10 food items), frequency of consumption of selected foods in the U.S. (15 food items), and quantitative changes of food consumption since coming to the U.S. Quantitative changes of food consumption was assessed in terms of never eat, eat only since coming to the U.S., eat less, and eat more of 49 food items commonly used in American and Chinese cookery. In section three, participants were asked to recall all foods and amounts, including snacks and beverages, they had eaten during the previous 24 hours.

Procedure

A cover letter explaining the study was developed to accompany the instrument. Questionnaires were color coded according to universities for follow up purpose only (OSU: orange, OU: pink, UCO: green, and OCU: blue). The cover letter and questionnaire were reproduced at the Oklahoma State University Engineering Duplicating Services and the University's Central Mailing Services facilitated the mailing and return of the questionnaires. The self-addressed, prepaid envelopes for students returning questionnaires were provided by the researcher. Two weeks were allowed for the completion of the questionnaire. The 582 questionnaires were mailed on September 9, 1995, and participants were asked to return them on or before September 25, 1995.

Scoring

The food consumption data were scored as follows:

Food preferences: The scale from 1 (never eaten) to 4 (like) indicates preferences for specific American foods.

	Points
Never eaten	1
Dislike	2
Accept	3
Like	4

Frequency of food consumption: The scale from 1 (never) to 4 (frequent) indicates frequency of dietary consumption of selected foods in the U.S..

	Points
Never	1
Rarely (1-3 times per month)	2
Sometimes (1-3 times per week)	3
Frequently (more than 3 times per week)	4

Data Analysis

The data collected were transcribed into computer for statistical analysis using the software program PC-File III. In the data analysis process, Statistical Analysis System (S.A.S) (Helwig, 1985) was applied. In addition to frequency tables, Chi-square analysis was used to analyze the data and test hypotheses (Shavelson, 1988; Steele and Torrie, 1980). Criteria for significance level was $p \leq 0.05$.

For more accurate statistical analysis and effective comparison of the personal characteristics, some of the categories were condensed to the following groupings:

Age: under 26, 26-30, and above 30;

Area of study: College of Arts & Sciences, College of Business Administration, College of Education, College of Engineering, Architecture, and Technology, and others;

Marital status: single and married;

Number of family members in household: none, one and more;

Where food is usually consumed: Student Union, residence hall cafeteria, and home;

Food preferences: well, no preference, and not at all.

Quantitative changes of food consumption: never eat, eat less, and eat more.

CHAPTER IV

RESULTS AND DISCUSSION

The purposes in this study were 1) to discuss the cultural background, examine and explore food habits, health knowledge and dietary changes among Taiwanese students living in Oklahoma, and 2) to investigate the relationships among the subjects' demographic characteristics and food preferences, health knowledge, western-style food experiences, food buying practices, consumption of food groups, and 24-hour dietary recall. Data were obtained using the research instrument described in Chapter III. The questionnaires were mailed to Taiwanese students in Oklahoma State University (N=76), University of Oklahoma (N=121), University of Central Oklahoma (N=190), and Oklahoma City University (N=195). Of the 582 questionnaires distributed, 74 were returned unopened because of these students' graduation or change of address, however, 164 out of 508 (N=582 minus 74) were successfully completed and returned. The response rate was 32 percent. Findings in this study are presented in three sections: characteristics of survey participants on selected variables, frequency tables on other general information, and results of statistical analysis and testing of hypotheses.

Characteristics of Survey Participants

Nine demographic characteristics were analyzed. These were: gender, age, major, education level, marital status, number of family members in household, length of time in the U.S., place of residence, and where food is usually consumed.

Gender and Age

Of the 164 respondents, 50.6% (N=83) were males, and 49.4% (N=81) were females. The predominant age ranges of respondents were 26-30 years (N=74, 45.1%) and 21-25 years (N=56, 34.1%). Six students each (3.7%) were under 20 years of age or 36 and order, while 22 students (13.4%) were between the ages of 31-35 (Table 1).

Major and Education Level

The major category was divided according to the seven areas of study or colleges where students were enrolled (Tale 1). Almost two fifths of the respondents were students from the College of Business Administration (N=69, 42.1%), 23.2% (N=38) were from the College of Arts and Sciences, and 15.9% (N=26) were from the College of Engineering, Architecture, and Technology. In education level, the predominant type of students were graduates (N=91, 55.5%) while 44.5% (N=73) were undergraduates (Table 1).

TABLE 1

FREQUENCY AND PERCENTAGE OF PERSONAL CHARACTERISTICS OF TAIWANESE STUDENTS

Personal Characteristics	Frequency (N)	Percentage(%)
Gender		
Male	83	50.6
Female	81	49.4
Age		
Under 20	6	3.7
21-25	56	34.1
26-30	74	45.1
31-35	22	13.4
Above 36	6	3.7
Area of Study		
College of Arts & Sciences	38	23.2
College of Business Administration	69	42.1
College of Education	19	11.6
College of Engineering, Architecture & Technology	26	15.9
College of Human Environmental Sciences	8	4.9
College of Medicine	3	1.8
College of Agricultural Sciences & Natural Resources	1	0.6
Education Level		
Undergraduate	73	44.5
Graduate	91	55.5

TABLE 1 (Continued)

Personal Characteristics	Frequency (N)	Percentage (%)
Marital Status		
Single	131	79.9
Married	29	17.7
Other	4	2.4
Number of Family Members in Household		
None	112	68.3
1	27	16.5
2	16	9.8
3	4	2.4
4	2	1.2
5	1	0.6
Did not answer	2	1.2
Length of Time in The U.S.		
Less than 1 year	14	8.5
1-2	44	26.8
2-3	35	21.3
3-4	31	18.9
4-5	16	9.8
More than 5	24	14.6
Place of Residence		
Apartment	125	76.2
House	22	13.4
Residence Hall	17	10.4
Where Food is Usually Consumed		
Student Union	2	1.2
Residence Hall Cafeteria	16	9.8
Home	132	80.5
Other (Restaurant)	14	8.5

Marital Status and Number of

Family Members in Household

Almost four fifths of the respondents were single (N=131, 79.9%), while 17.7% (N=29) were married. The majority of respondents (N=112, 68.3%) had no family members living with them in Oklahoma, while 30.5% (N=50) of the respondents had one or more family members in the same household (Table 1).

Length of Time in The U.S.

The length of time students have lived in the U.S. was divided into six time periods: less than one year, one to two years, two to three years, three to four years, four to five years, and more than five years (Table 1). Forty four respondents (26.8%) have been in the U.S. for one to two years, 35 (21.3%) for two to three years, and 31 (18.9%) for three to four years.

Place of Residence and

Where Food is Usually Consumed

Most of the Taiwanese students lived in apartments (N=125, 76.2%). The rest lived in houses (N= 22, 13.4%) and residence halls (N=17, 10.4%). The places where foods are usually consumed are shown in Table 1. The majority of the respondents

(N=132, 80.5%) consumed their foods at home. Very few students consumed their foods at the Student Union, Residence Hall Cafeteria or local restaurants (Table 1).

Responses to Descriptive Questions and Others

Cook the Majority of Meals in Taiwan and in The U.S.

Most of the respondents (N=148, 90.2%) did not cook the majority of meals in Taiwan. About three fourths of the respondents (73.6%, N=120), however, cook the majority of their meals while living in the U.S. (Table 2).

TABLE 2

FREQUENCY AND PERCENTAGE OF RESPONDENTS COOKING MEALS IN TAIWAN AND IN THE U.S

Cook the Majority of Meals	In Taiwan		In the U.S.	
	N	%	N	%
Yes	16	9.8	120	73.6
No	148	90.2	44	26.4

Selecting Hot or Cold Foods

to Maintain Equilibrium

Almost half of the respondents (N=83, 51.2%) believed and practiced the concept of selecting "hot" or "cold" foods to maintain equilibrium. In contrast, 78 of the respondents (48.2%) did not select hot or cold foods to maintain equilibrium (Table 3).

TABLE 3

FREQUENCY AND PERCENTAGE OF RESPONDENTS SELECTING HOT OR COLD FOOD TO MAINTAIN EQUILIBRIUM

Selecting Foods to Maintain Equilibrium	Frequency N	Percentage %
Yes	78	47.6
No	83	50.6
Did not answer	3	1.8

The Awareness of the USDA

Food Guide Pyramid

Almost two thirds of the respondents (N=103, 62.8%) were not aware the USDA Food Guide Pyramid existed. The remaining one third knew about the Food Guide Pyramid very well or fairly well (Table 4).

Knowledge of the USDA Food Guide Pyramid

The USDA Food Guide Pyramid consists of five food groups (Table 5). The survey instrument asked students how many servings of the five food groups to eat daily. There appeared to be a lack of knowledge among Taiwanese students as to the recommended servings to be consumed daily from the five food groups. More than half of the respondents (N=96, 58.8%) underestimated the need for the "rice, cereal, bread, and pasta" group while 68 students (41.5%) underestimated the need for the "vegetable" group. The "meat, poultry, fish, and eggs" group received the largest number of correct responses (N=70, 42.6%), however, 31 respondents (18.9%) overestimated the number of servings from this food group (Table 5). Adequate diet in the "milk, yogurt, and cheese" group required the consumption of 2-3 servings. In this study, only 36.6% (N=60) of the students reported the correct number of servings to be consumed daily. The rest either underestimated or overestimated the number of servings. Presumably, those (N=44,

26.8%) who did not answer this question may have had no knowledge of the USDA Food Guide Pyramid (Table 5).

TABLE 4

FREQUENCY AND PERCENTAGE OF RESPONDENTS AWARE OF THE USDA FOOD GUIDE PYRAMID

Awareness of the USDA Food Guide Pyramid	Frequency N	Percentage %
Very well	11	6.9
Fairly well	48	30.0
Not at all	101	62.8
Did not answer	2	1.2

TABLE 5

RESPONSES OF RESPONDENTS IN REGARD TO AMOUNTS CONSUMED DAILY FOODS ON THE USDA FOOD GUIDE PYRAMID

Number of Servings	Frequency (N)	Percentage (%)
Rice, cereal, bread, and pasta group		
Less than 6	96	58.5
6-11	24*	14.6
Did not answer	44	26.8
Meat, poultry, fish, and eggs group		
Less than 2	19	11.6
2-3	70*	42.6
More than 3	31	18.9
Did not answer	44	26.8
Milk, yogurt, and cheese group		
Less than 2	51	31.1
2-3	60*	36.6
More than 3	9	5.5
Did not answer	44	26.8
Vegetable group		
Less than 3	68	41.5
3-5	52*	31.7
Did not answer	44	26.8
Fruit group		
Less than 2	55	33.5
2-4	64*	39.0
More than 4	1	0.6
Did not answer	44	26.8

* Respondents giving the correct number of servings recommended per day

Nutritional Value

The majority of respondents (N=115, 70.1%) perceived Chinese foods to have a higher nutritional value than American foods. In contrast, 38 students (23.2%) perceived American foods as having a higher nutritional value than Chinese foods (Table 6).

TABLE 6

FREQUENCY AND PERCENTAGE OF RESPONDENTS' PERCEPTION OF NUTRITIONAL VALUE OF FOODS

Nutritional Value	Frequency (N)	Percentage (%)
Chinese foods	115	70.1
American foods	38	23.2
Others	11	6.7

Health Condition, Weight,

and Food Habits Changed

In general, 27% of the respondents believed that their health condition had improved since coming to the U.S., while 20% thought that their health condition had worsed (Table 7). Half of the respondents (N=85, 51.8%), however, stated that their

TABLE 7

FREQUENCY AND PERCENTAGE OF RESPONDENTS' HEALTH CONDITION, WEIGHT AND FOOD HABITS CHANGED

Health Condition, Weight and Food Habits Changed	Frequency N	Percentage %
Health Condition		
Improved	45	27.4
Worse	34	20.7
The same	85	51.8
Weight		
Gained	90	54.9
Lost	25	15.2
The same	49	29.9
Gained weight		
40 pounds	3	3.3
21-30	6	6.7
11-20	30	33.3
1-10	51	56.7
Lost weight		
30 pounds	1	4.0
11-20	7	28.0
1-10	17	68.0
Food Habits Changed		
Yes	114	69.5
No	50	30.5

health condition was unchanged (Table 7).

Weight gain was very common for most international students living in the U.S. More than half of the respondents (N=90, 54.9%) gained weight and 3 students gained 40 pounds exactly. In contrast, only 25 respondents lost weight (Table 7). About 69% (N=114) of the respondents believed that they had changed their food habits and consumed more western-style foods since coming to the U.S. (Table 7).

Number of Times Breakfast Was Eaten

Students were asked how many times per week they ate breakfast while in Taiwan and in the U.S. Approximately twice as many respondents (N=32, 19.5%) missed breakfasts in the U.S. as they did in Taiwan (N=14, 8.5%). More than half (N=93, 56.7%) of the students ate breakfasts 6-7 times per week in Taiwan, while only one fourth (N=41, 25%) of the students ate breakfasts 6-7 times per week in the U.S. Fifty five percent of the students ate from 1-5 times breakfast per week in the U.S. (Table 8; Figure 1).

TABLE 8

FREQUENCY AND PERCENTAGE OF RESPONDENTS' NUMBER OF TIMES BREAKFAST WAS EATEN

	In Taiwan		In the U.S.	
Number of Times	N	%	N	%
0 per week	14	8.5	32	19.5
1-3	24	14.7	57	34.8
4-5	33	20.1	34	20.7
6-7	93	56.7	41	25.0

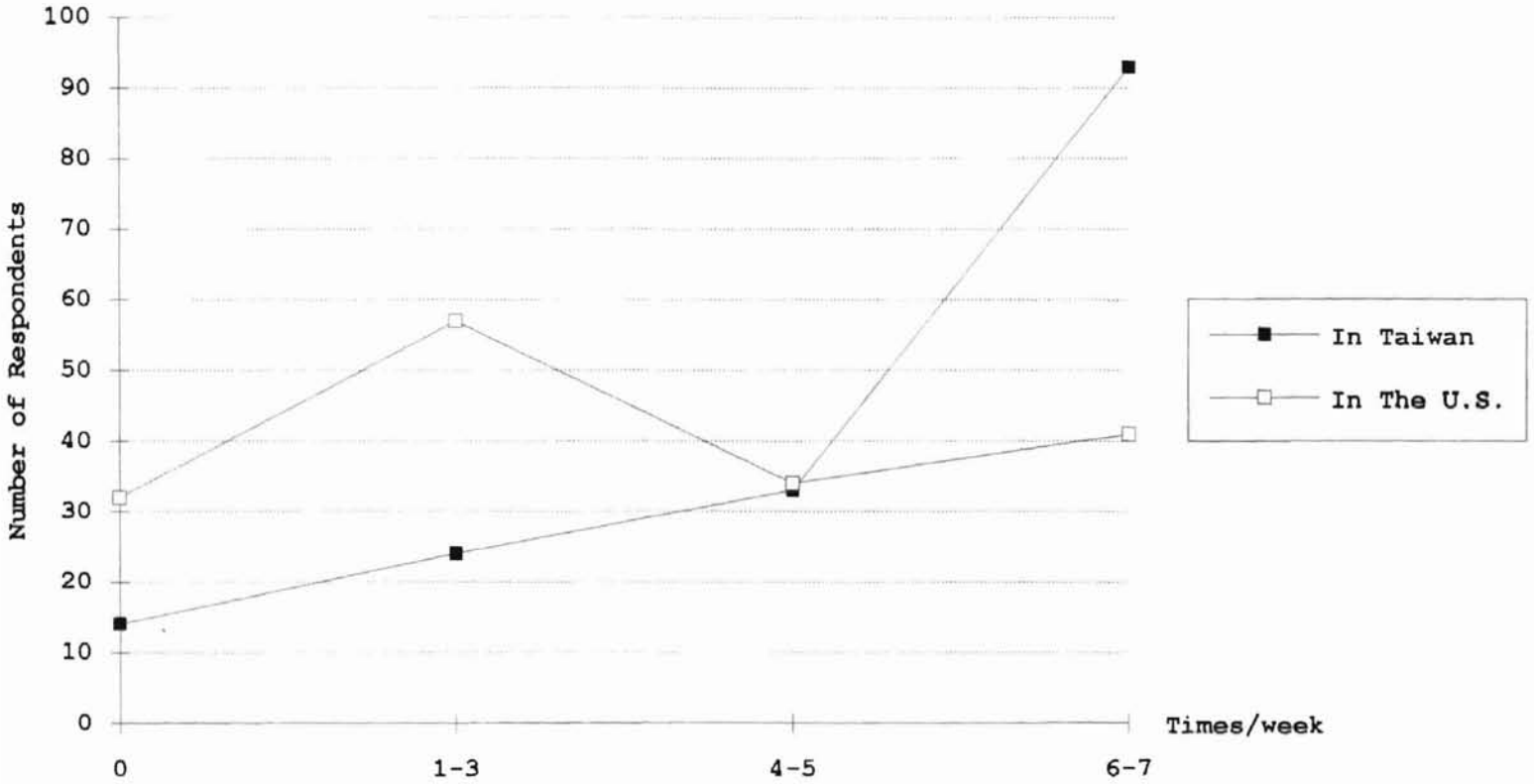

Figure 1. Number of Times Breakfast Was Eaten

Western-Style Food Experiences

The survey instrument also asked students how many times per week they ate in western-style restaurants (including American fast food restaurants) while in Taiwan and in the U.S. Seventy respondents (42%) did not eat in any western-style restaurants once a week in Taiwan. In contrast, only 12% reported not eating in western-style restaurants once a week while living in the U.S. There were no respondents eating in western-style restaurants more than 7 times a week in Taiwan. In contrast, 14 respondents ate in western-style restaurants more than 7 times a week in the U.S. (Table 9; Figure 2). Almost half (N=81, 49.4%) of the respondents ate in western- style restaurants at least 1-3 times a week in Taiwan and 57.9% ate in western-style restaurants 1-3 times a week in the U.S. (Table 9; Figure 2). The majority of students (N=142, 86.6%) ate out in Chinese-style restaurants in Taiwan. Half of the students (N=82, 50%) ate out in American-style restaurants in the U.S., while about half (46.3%) ate out in Chinese-style restaurants in the U.S. (Table 9; Figure 3).

TABLE 9

FREQUENCY AND PERCENTAGE OF RESPONDENTS' WESTERN STYLE FOOD EXPERIENCES IN RESTAURANTS

	In Taiwan		In The U.S.	
Number of Times	N	%	N	%
0 per week	70	42.7	20	12.2
1-3	81	49.4	95	57.9
4-6	13	7.9	35	21.3
7 or more	0	0.0	14	8.5
Restaurant Style	Eat out in Taiwan		Eat out in The US.	
Chinese style	142	86.6	76	46.3
American style	18	11.0	82	50.0
Others	4	2.4	6	3.7

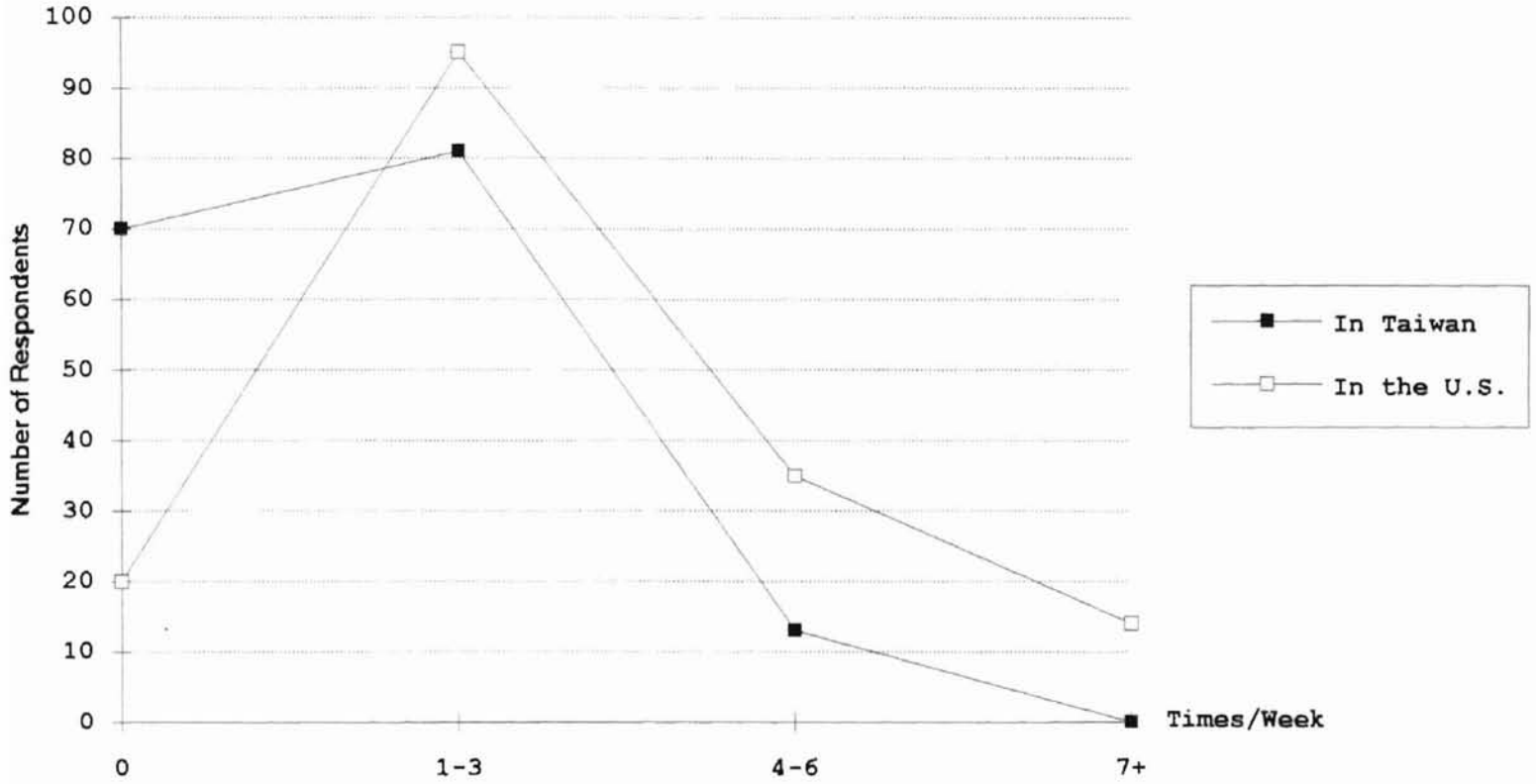

Figure 2. Western-Style Food Experience In Restaurants

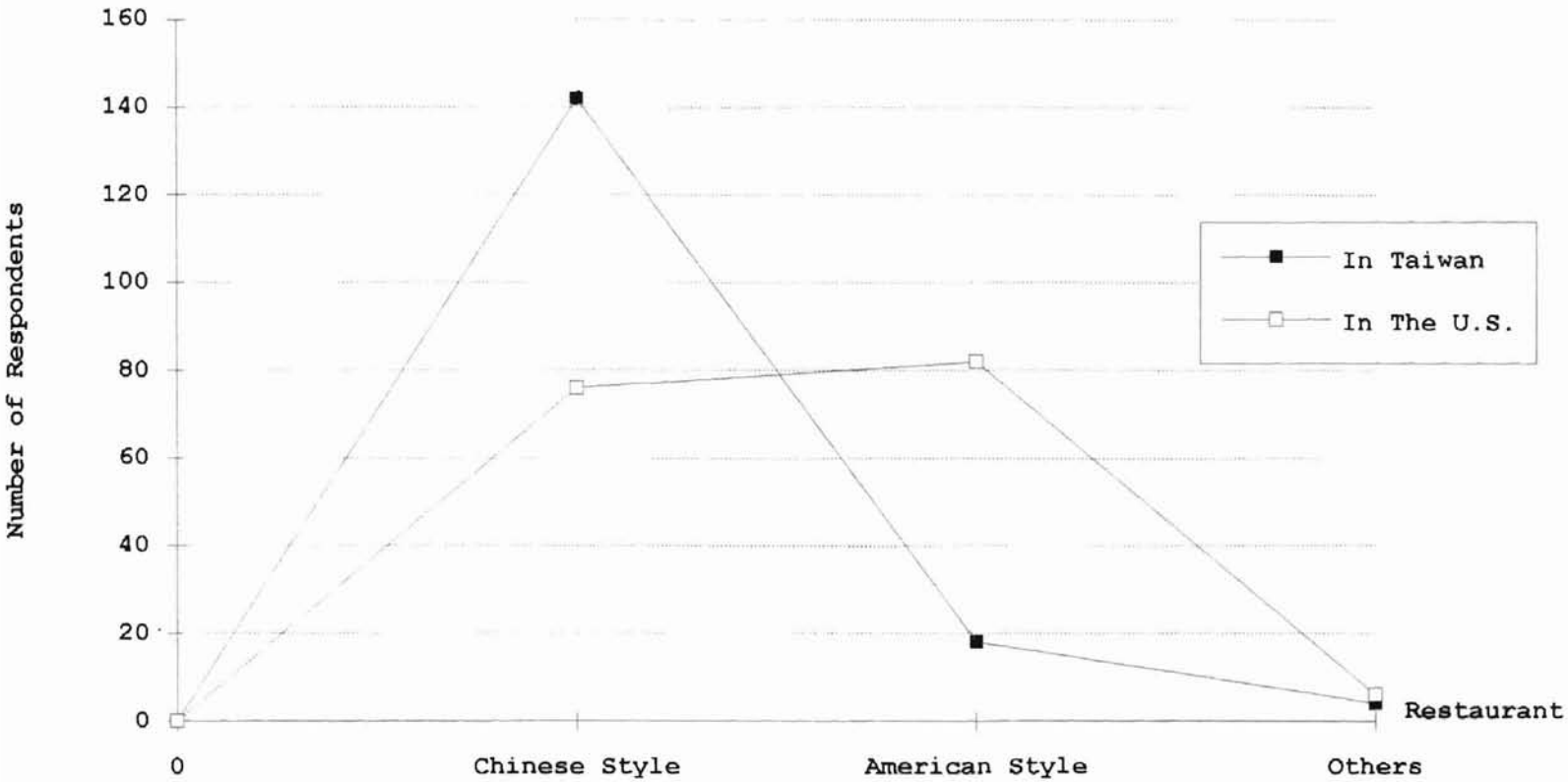

Figure 3. Food Experiences in Restaurants

American Food Preferences

About half of the respondents (50.6%) liked American foods while in Taiwan, and somewhat less arriving in the U.S. (35.4%) and since living in the U.S. (41.5%). Almost the same number of students indicated no preference for American food while in Taiwan, upon arriving in the U.S. and since living in the U.S. (Table 10; Figure 4).

TABLE 10

FREQUENCY AND PERCENTAGE OF RESPONDENTS' AMERICAN FOOD PREFERENCES

Preferences	In Taiwan		Arriving in US.		In The US. Now	
	N	%	N	%	N	%
Very well	10	6.1	7	4.3	8	4.9
Fairly well	73	44.5	51	31.1	60	36.6
No preference	66	40.2	75	45.7	74	45.1
Not at all	15	9.1	31	18.9	22	13.4

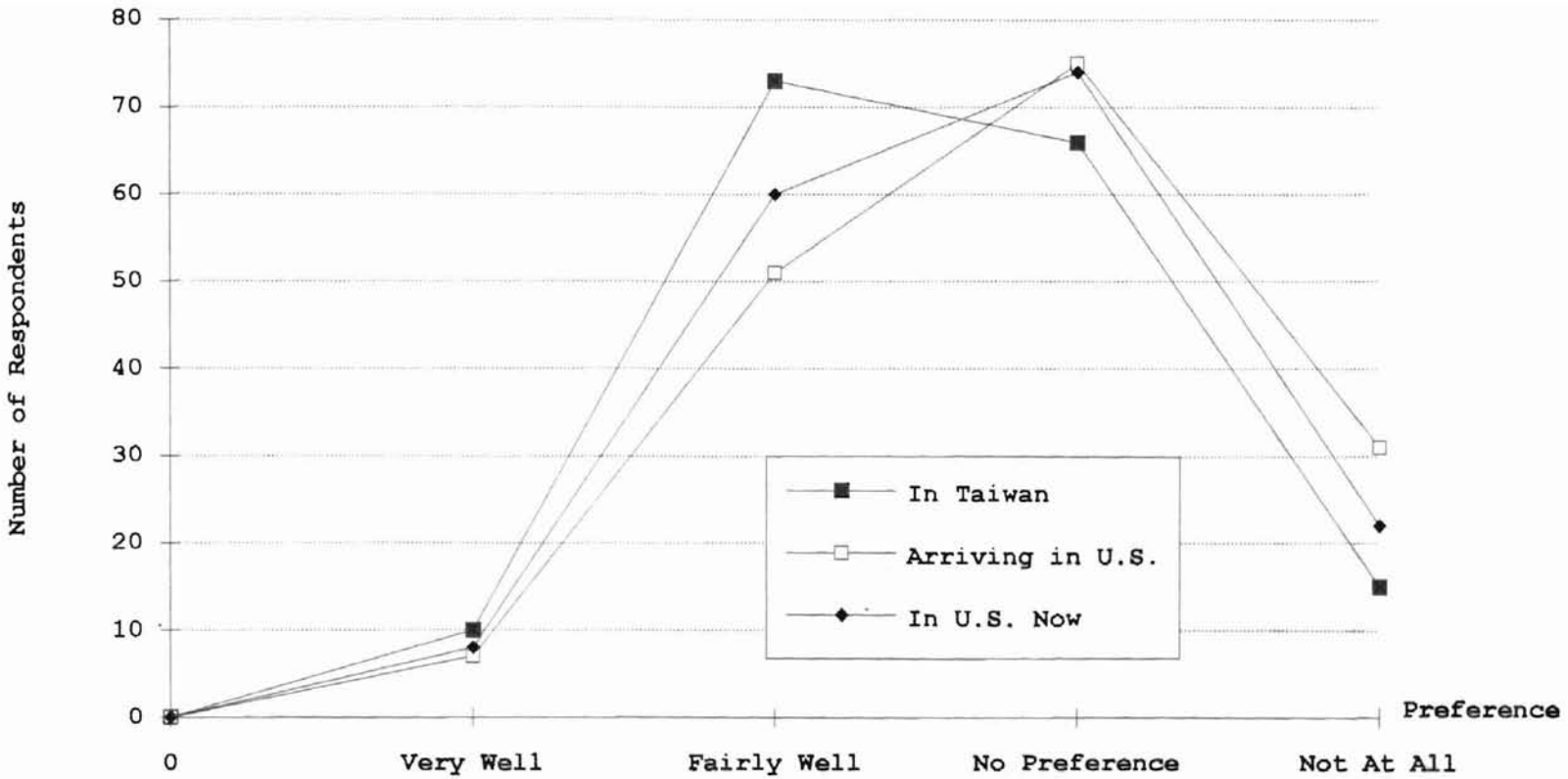

Figure 4. American Food Preferences

Shopping Experiences

Of the 164 respondents, 130 (79.8%) shopped in oriental food markets 1-3 times per month, while only 76 (46.9%) shopped in U.S. supermarkets 1-3 times per week. Four respondents shopped in oriental food markets more than 7 times per week, while 19 shopped in U.S. supermarkets over 7 times per week (Table 11; Figure 5).

Although students in this study were located in four campuses, a majority of them (87.2%) shopped at oriental food markets in Oklahoma City (Table 11). There is an oriental food market and several Chinese restaurants near a shopping mall in Oklahoma City. Perhaps Taiwanese students shopped in Oklahoma City because the oriental food market there is larger than those found in Stillwater, Norman, or Edmond, and students can obtain most of foods that they need in one place.

TABLE 11

SHOPPING EXPERIENCES OF RESPONDENTS IN ORIENTAL FOOD MARKETS AND THE U.S SUPERMARKETS

Number of Times	Frequency (N)	Percentage (%)
In Oriental Food Markets		
0 per month	8	4.9
1-3	130	79.8
4-6	21	12.9
over 7	4	2.5
In U.S. Supermarkets		
0 per month	1	0.6
1-3	76	46.9
4-6	66	40.7
over 7	19	11.7
Where Students Usually Shop in Oriental Food Markets		
Stillwater	2	1.2
Edmond	2	1.2
Oklahoma City	143	87.2
Tulsa	16	9.7
Dallas	1	0.6

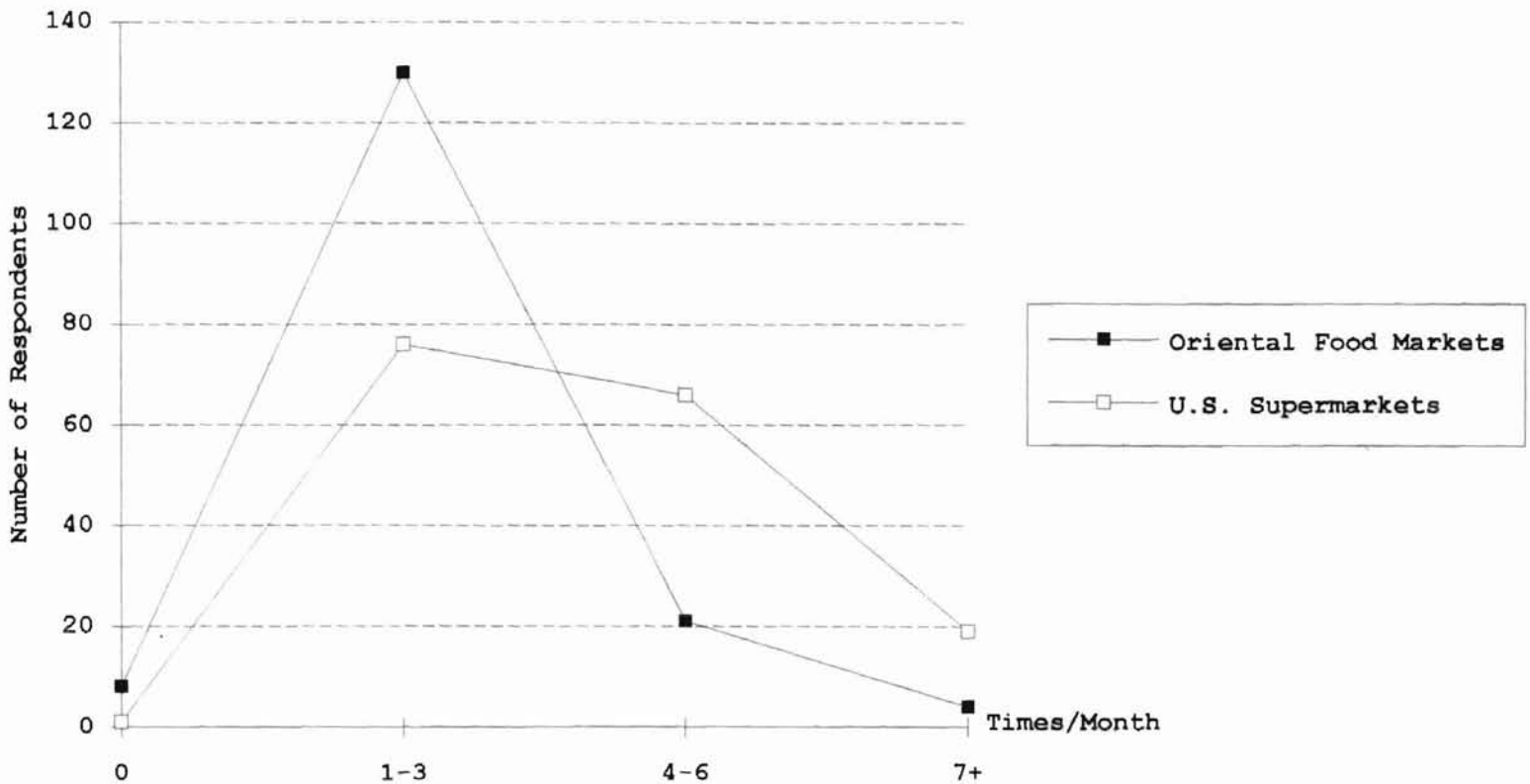

Figure 5. Shopping Experiences

Availability of Chinese Foods

Respondents were asked about the availability of Chinese foods in the area where they live. Half of respondents (N=81, 49.4%) reported that most of the Chinese foods were available in the areas where they lived, while 50.6% said many Chinese foods were not available (Table 12). They managed to get some Chinese foods from oriental food markets in Oklahoma City/Tulsa or Dallas. They also received foods from friends or from home in Taiwan. Only five respondents ordered oriental foods by mail (Table 12; Figure 6).

Thirty one students mentioned that traditional foods, such as green onion pie, tempura, fried dumpling, and glutinous rice were not available in Oklahoma. Some kinds of vegetables such as Chinese cabbage, leaf mustard, bitter-melon, lotus root, and white gourd, and Taiwanese breakfast foods such as soybean milk, Chinese croissants, baked wheat cake, baked and fried pastries wrapped together, and a sweet or salty rice ball made of sticky rice were not available in the areas where many students live. In addition, some kinds of seafood, fruits, soybean products, snacks, and soft drinks were also reported as not available in Oklahoma (Table 12).

TABLE 12

AVAILABILITY OF CHINESE FOODS IN THE AREA WHERE RESPONDENTS LIVE

Availability	Frequency (N)	Percentage (%)
Yes	81	49.4
No	83	50.6
Where the foods can be obtained*		
OKC/Tulsa	80	37.9
Shop in Dallas	44	20.9
From home in Taiwan	51	24.2
From friends	31	14.6
Order by mail	5	2.4
Chinese foods not available*		
Traditional Taiwanese foods	31	20.7
Taiwanese breakfast	22	14.7
Seafood	19	12.7
Some kinds of vegetables	28	18.7
Some kinds of fruits	20	13.3
Soybean products	11	7.3
Some kinds of snacks	10	6.7
Some kinds of soft drinks	9	6.0

* Multiple answers were allowed

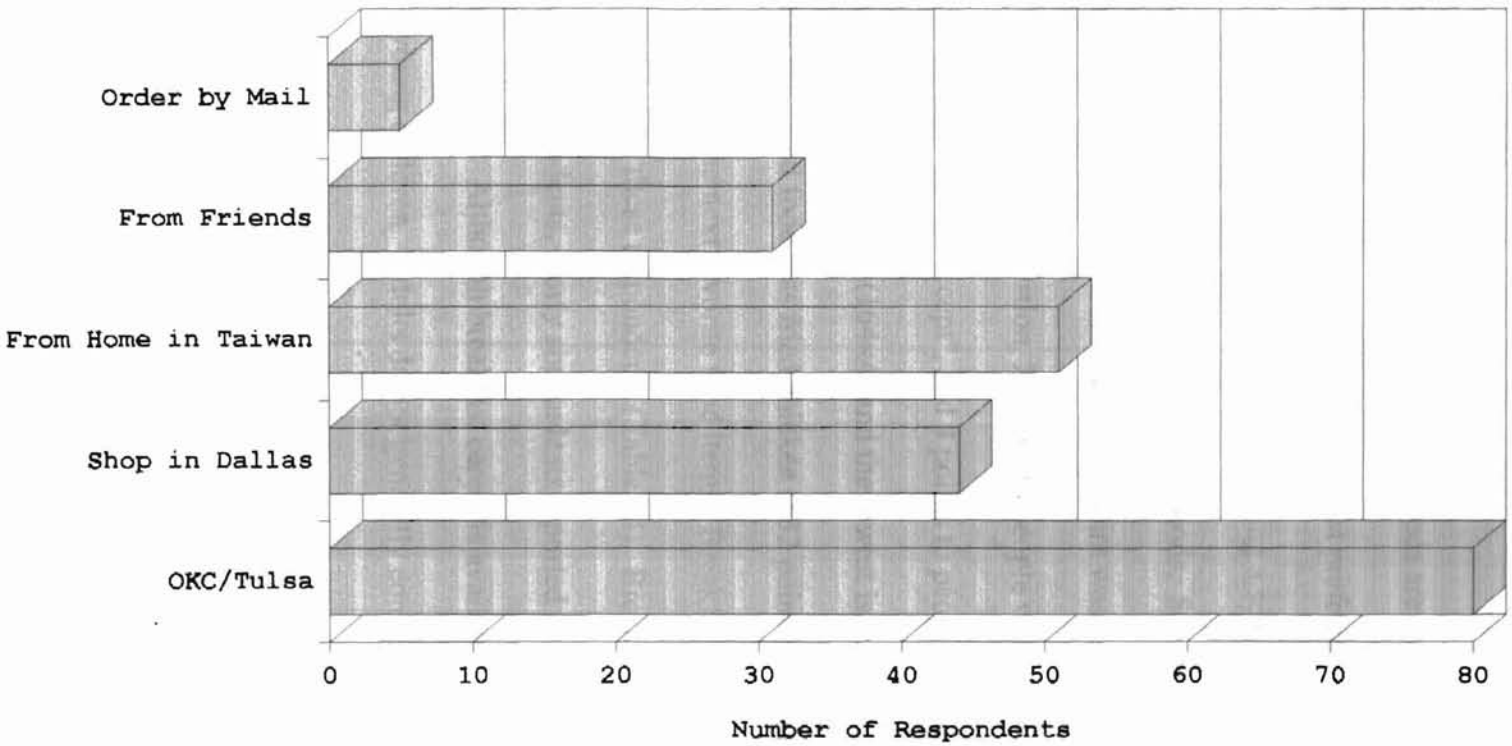

Figure 6. Channels for Obtaining Chinese Foods

Food Preferences for Specific American Foods

General preferences for specific American foods are shown in Table 13. Table 14 shows the foods that were the most preferred and least preferred by Taiwanese students in Oklahoma. The food preferences were calculated using a scale from 1 (never eaten) to 4 (like) indicating preferences for specific American foods. Scores were assigned to each food item according to responses. For example, 1 point was assigned to persons who answered "never eaten" to this question, 2 points to people who answered "dislike", 3 points to people who answered "accept", and 4 points to people who answered "like". The highest possible points is 656 (164×4) and the lowest is 164 (164×1).

The most preferred food was fried chicken (532 points). Steak (524 points) and salad (523 points) were the next favorite food items. Breakfast cereal (395 points) was the least favorite food for these respondents (Table 14). Breakfast cereal is an unfamiliar food to the Taiwanese students. Forty six students reported that they have never eaten this food item (Table 13). Although breakfast cereal is available in Taiwan, it is only popular among young children. Adults do not generally consume cereal for breakfast.

TABLE 13

FOOD PREFERENCES OF RESPONDENTS
FOR SPECIFIC AMERICAN FOODS

Food Item	Like		Accept		Dislike		Never eaten	
	N	%	N	%	N	%	N	%
Steak	66	40.2	70	42.7	22	13.4	6	3.7
Fried Chicken	59	36.0	88	53.7	15	9.2	2	1.2
Salad	58	35.4	84	51.2	17	10.4	5	3.1
Pizza	43	26.2	89	54.3	29	17.7	3	1.8
Breakfast Cereal	30	18.3	53	32.3	35	21.3	46	28.1
French Fries	26	15.9	98	59.8	40	24.4	0	0.0
Sandwiches	23	14.0	115	70.1	26	15.8	0	0.0
Hot Dogs	19	11.6	98	59.8	47	28.7	0	0.0
Hamburger	16	9.8	106	64.6	42	25.7	0	0.0
Cheese	9	5.5	79	48.2	72	43.9	4	2.4

TABLE 14

SCORES FOR SPECIFIC AMERICAN FOODS ACCORDING TO RESPONDENTS' PREFERENCES

Food Item	Scores*	Food Item	Scores
Fried chicken	532	French fries	478
Steak	524	Hamburger	466
Salad	523	Hot dogs	464
Pizza	500	Cheese	421
Sandwiches	489	Breakfast cereal	395

* Highest possible score = 656
Lowest possible score = 164

Dietary Consumption of Specific Foods in the U.S.

The food frequency survey encompassed of 15 different food items. The food consumption was scored from scale 1 (never) to 4 (frequent) indicating frequency of dietary consumption of selected foods. One point was assigned to individuals who answered "never", 2 points to those who answered "rarely", 3 points to those who answered "sometimes", and 4 points to individuals who answered "frequent". The frequency of dietary consumption of 15 specific foods is presented in Table 15. Rice is the food item that the majority (N=126, 76.8%) of respondents consumed more than 3 times per week. Other foods consumed frequently on a weekly basis by at least 60% of the respondents include cooked vegetables, fresh fruits, and eggs. Alcoholic beverages,

however, was an item that more than half of the respondents (N=90) have never consumed in the U.S. (Table 15). Alcoholic beverages are not commonly consumed by Taiwanese students under 25 years of age, although consumption of wine and beer are popular among adults in Taiwan. Fish/shellfish are not always readily available and the high price of seafoods in Oklahoma, hence, Taiwanese students in this study rarely consumed this food item.

TABLE 15

FREQUENCY AND PERCENTAGE OF DIETARY CONSUMPTION OF SPECIFIC FOODS IN THE U.S.

Food	Frequent*		Sometimes*		Rarely*		Never	
	N	%	N	%	N	%	N	%
Rice	126	76.8	22	13.4	16	9.7	0	0.0
Cooked vegetables	109	66.5	38	23.2	17	10.4	0	0.0
Fresh fruits	104	63.4	40	24.4	20	12.2	0	0.0
Eggs	101	61.6	53	32.3	7	4.3	3	1.8
Coffee, tea, coke	90	54.9	31	18.9	39	23.8	4	2.4
Chicken	79	48.2	68	41.5	12	7.3	5	3.1
Milk	73	44.5	29	17.7	53	32.3	9	5.5
Fresh vegetables	65	39.6	55	33.5	35	21.3	9	5.5
Pork	64	39.0	73	44.5	22	13.4	5	3.1
Beef	57	34.8	62	37.8	34	20.7	11	6.7
Noodle	48	29.3	75	45.7	40	24.4	1	0.6
Breakfast cereal	25	15.2	29	17.7	64	39.0	46	28.1
Hamburger/sandwiches	18	11.0	69	42.1	77	47.0	0	0.0
Fish/shellfish	10	6.1	36	22.0	107	65.2	11	6.7
Alcohol beverage	5	3.1	10	6.1	59	35.9	90	54.9

*Rarely: 1-3 times per month
Sometimes: 1-3 times per week
Frequent: more than 3 times per week

Table 16 shows the scores of dietary consumption of selected foods. The first five food items commonly eaten were: rice (602 points), cooked vegetables (584 points), eggs (580 points), fresh fruits (576 points), and chicken (549 points). Rice remains the food most commonly eaten in the U.S. by all respondents. In contrast, alcoholic beverages, breakfast cereal, and fish/shellfish were the food items that respondents consumed the least in the U.S. (Table 16).

TABLE 16

SCORES FOR DIETARY CONSUMPTION OF SPECIFIC FOODS IN THE U.S.

Food Item	Scores*	Food Item	Scores*
Rice	602	Noodle	498
Cooked vegetables	584	Milk	494
Eggs	580	Beef	493
Fresh fruits	576	Hamburger/sandwiches	433
Chicken	549	Fish/shellfish	373
Coffee, tea, coke	535	Breakfast cereal	361
Pork	524	Alcoholic beverage	267
Fresh vegetables	504		

* Highest Possible score = 656
Lowest possible score = 164

Quantitative Changes of Food Consumption

There were 114 students (69.5%) reporting that their food habits had changed since coming to the U.S. (Table 7). To study quantitative changes of food consumption while in the U.S., students were asked to rate a list of 49 food items using a scale of 1 (never eat) to 4 (eat more since coming to the U.S.). Food items ranking in the top 20 in the "eat more" category are presented in Table 17. The top six food items which respondents increased their consumption since coming to the U.S. were: chicken (N=130, 79.3%), milk (76.8%), eggs (72.6%), beef (70.7%), Coke (67.1%), and ice cream (64%). In Taiwan, the consumption of poultry includes chicken, ducks, and geese. The Taiwanese rarely consume turkey. Taiwanese students increased their consumption of chicken in the U.S. because they could not obtain ducks and geese in the U.S. supermarkets. In Taiwan, milk is not well accepted by some people, however, since coming to the U.S., students have consumed milk frequently as shown Table 15. Seventy three of the respondents consumed milk more than 3 times a week. In Table 17, 126 respondents indicated an increased milk consumption (Table 17). The reason why students increased in the consumption of milk might be the price of milk which is cheaper than in Taiwan. Likewise, 67.1% of the respondents increased their intake of Coke, a typical American beverage (Table 17). The price of beef in the U.S. is much cheaper than in Taiwan, thus, beef consumption increased among Taiwanese students in Oklahoma. In the U.S., beef is well accepted by students except by vegetarians. In Taiwan, a small number of elderly and vegetarians do not consumed beef. More than half of the students

increased their consumption of oriental instant noodles. It is possible that instant noodle soups may have replaced some meals eaten by Taiwanese students.

TABLE 17

THE TOP 20 FOOD ITEMS WHICH RESPONDENTS INCREASED THEIR CONSUMPTION SINCE COMING TO THE U.S.

Food Item	Frequency (N)	Percentage (%)
1. Chicken	130	79.3
2. Milk	126	76.8
3. Eggs	119	72.6
4. Beef	116	70.7
5. Coke	110	67.1
6. Ice cream	105	64.0
7. Oriental instant noodle	97	59.2
8. Fresh vegetables	97	59.2
9. Pepper	96	58.5
10. Processed meat	95	57.9
11. Hamburger	95	57.9
12. Salad dressing	92	56.1
13. Ketchup	91	55.5
14. Noodle	91	55.5
15. French fries	90	55.2
16. Cookies	86	52.4
17. Coffee	85	51.8
18. Potato chips	83	50.6
19. Butter/margarine	82	50.0
20. Yogurt	82	50.0

The top 5 food items for which students had decreased their consumption were: fish/shellfish (80.5%), Chinese tea (74.4%), Chinese spices (67.1%), MSG (monosodium glutamate) (64.6%), and rice (62.8%) (see Table 18). Because of the unavailability and high price of seafoods in Oklahoma, a large number of students decreased their consumption of seafoods. MSG is the most common flavoring ingredient being used in most Taiwanese households, however, inconvenience or non-availability of MSG as well as Chinese spices, and Chinese tea may have caused students to decrease the use of these foods. Rice, the staple food in Taiwan, was also mentioned by 103 (62.8%) students as food that they have decreased their consumption (Table 18). Perhaps this is due to time constraint.

The top 10 food items that students ate only in the U.S. are typical American foods, such as cheese (38.4%), breakfast cereal (29.9%), butter/margarine (28.7%), yogurt (22.6%), potato chips (18.9%), and hamburger (18.3%) (Table 19). These foods are available but not often eaten in Taiwan, except for potato chips and hamburger, which are popular with children. Milk products, such as milk, cheese, and yogurt have not been eaten regularly by Taiwanese, while convenience foods, such as frozen vegetables, processed meat, and canned fruits are seldom used by the average households in Taiwan.

Due to their non-availability, lard (47.6%) and MSG (monosodium glutamate) (54%) are two food items that many students reported that they had never used since coming to the U.S. (Table 20). These two ingredients are commonly used in Taiwanese cooking. The flavor of lard and MSG are considered more delicious than other fats and seasonings. Alcoholic beverages were seldom consumed by students. Ninety students

have never tasted wine while 78 students that had never consumed beer since coming to the U.S. (Table 20).

TABLE 18

THE TOP 20 FOOD ITEMS WHICH RESPONDENTS DECREASED THEIR CONSUMPTION SINCE COMING TO THE U.S.

Food Item	Frequency (N)	Percentage (%)
1. Fish/shellfish	132	80.5
2. Chinese tea	122	74.4
3. Chinese spices	110	67.1
4. MSG (monosodium glutamate)	106	64.6
5. Rice	103	62.8
6. Ginger	94	57.3
7. Salt	93	56.7
8. Tofu	92	56.1
9. Vinegar	91	55.5
10. Soy sauce	90	54.9
11. Candies	79	48.2
12. Fresh fruits	78	47.6
13. Pork	78	47.6
14. Garlic	77	47.0
15. Black tea	74	45.1
16. Poultry	74	45.1
17. Cooking oil	72	43.9
18. Lard	68	42.0
19. Pepper	61	37.2
20. Barbecue sauce	59	36.0

TABLE 19

THE TOP 10 FOOD ITEMS WHICH RESPONDENTS CONSUMED ONLY IN THE U.S.

Food Item	Frequency (N)	Percentage (%)
1. Cheese	63	38.4
2. Breakfast cereal	49	29.9
3. Frozen vegetables	47	28.7
4. Butter/margarine	41	25.0
5. Yogurt	37	22.6
6. Barbecue sauce	37	22.6
7. Processed meat	33	20.1
8. Canned fruits	33	20.1
9. Potato chips	31	18.9
10. Hamburger	30	18.3

TABLE 20

THE TOP 10 FOOD ITEMS WHICH RESPONDENTS REPORTED AS NEVER CONSUMED AFTER COMING TO THE U.S.

Food Item	Frequency (N)	Percentage (%)
1. Wine	90	54.9
2. Beer	78	47.6
3. Lard	78	47.6
4. MSG (monosodium glutamate)	54	32.9
5. Breakfast cereal	46	28.1
6. Canned fruits	38	23.2
7. Canned vegetables	33	20.1
8. Yogurt	26	15.9
9. Poultry	25	15.2
10. Coffee	23	14.0

The traditional Taiwanese breakfast includes porridge, Chinese croissants, or soybean milk. Few people eat breakfast cereal for breakfast in Taiwan. Almost one third (N=46) of students have never eaten breakfast cereal in the U.S. Canned fruits and canned vegetables are seldom used in Taiwan, hence, about one fifth of students in this study have not eaten them since coming to the U.S. A few students also reported not having consumed coffee in the U.S. (Table 20).

Examining Tables 17 and 19, it can be seen that Taiwanese students increased their consumption of the typical American foods since coming to the U.S. The intakes of Coke (67.1%), hamburger (57.9%), salad dressing (56.1%), french fries (55.2%), coffee

(51.8%), potato chips (50.6%) , and yogurt (50.0%) have increased. In contrast, cheese (38.4%), breakfast cereal (29.9%), yogurt (22.6%), potato chips (18.9%), and hamburger (18.3%) were consumed only in the U.S. by some of the students. One of the major changes in food habits among Taiwanese students is the increase consumption of milk (76.8%), ice cream (64.0%) , yogurt (50.0%), and cheese (38.4%) (Table 17 and 19). The researcher believes that milk is consumed as a substitute for soybean milk, the popular drink for breakfast in Taiwan. The lower cost of milk products in the U.S. may also have triggered the higher consumption of dairy products in general.

While the consumption of rice decreased (N=103, 62.8%), consumption of oriental instant noodle (N=97, 59.2%), hamburger (N=95, 57.9%), and noodles (N=91, 55.5%) increased, however, there is not enough quantitative data indicating that the increased consumption of oriental instant noodle, hamburger, or noodles would contribute to the decreases in rice consumption. In the meat group, the increased consumption of beef (N=116, 70.7%) and chicken (N=130, 79.3%) would compensate for the decreases in pork (N=78, 47.6%) (Table 18).

Consumption of Chinese tea was decreased by three fourths of the students, whereas consumption of coffee and Coke were increased. The use of MSG and Chinese spices consumption have decreased, while pepper, salad dressing, ketchup, and butter/margarine use have increased according to one half of the students.

The study of quantitative change of food consumption reflects the dietary change process occurring among Taiwanese students living in Oklahoma. Most of students

consumed both Chinese and American foods. Although certain traditional foods are retained, some new foods are also accepted and adopted by these students.

24-Hour Dietary Recall Based on The USDA Food Guide Pyramid

A summary of the number of servings of foods consumed daily for 24-hour based on the USDA Food Guide Pyramid is presented in Table 21. Almost all the students (158 out of 164) completed the 24-hour dietary recall. More than half of the respondents (N=100, 61.0%) consumed 6-11 servings of the "rice, cereal, bread, and pasta" group, while 35% of students consumed less than 6 servings for this food group. Ninety five students (57.9%) consumed the correct number of servings needed for the "meat, poultry, fish, and eggs" group, whereas 22 and 41 students consumed less than 2 servings and more than 3 servings, respectively. Only 24 students (14.7%) consumed 2-3 servings of the "milk, yogurt, and cheese" group during the previous 24 hours. More than four-fifths of the students (N=133, 81.1%) consumed less than 2 servings of this food group, while one student consumed more than 3 servings. Almost three fourths of students (N=124, 75.6%) consumed the correct number of servings needed for the "vegetable" group. In contrast, 32 respondents consumed less than 3 servings and 2 respondents consumed more than 5 servings for this group. In the "fruit" group, almost one fourth (26.3%) consumed the correct servings (2-4 servings) during a 24-hour period, while 114 students (69.5%) consumed less than 2 servings. Only one student consumed more than 4 servings during a 24-hour period.

TABLE 21

FREQUENCY AND PERCENTAGE OF RESPONDENTS' 24-HOUR DIETARY RECALL BASED ON THE USDA FOOD GUIDE PYRAMID

Number of Servings	Frequency (N)	Percentage (%)
Rice, cereal, bread, and pasta group		
Less than 6	58	35.4
6-11	100*	61.0
Did not answer	6	3.6
Meat, poultry, fish, and eggs group		
Less than 2	22	13.5
2-3	95*	57.9
More than 3	41	25.0
Did not answer	6	3.6
Milk, yogurt, and cheese group		
Less than 2	133	81.1
2-3	24*	14.7
More than 3	1	0.6
Did not answer	6	3.6
Vegetable group		
Less than 3	32	19.6
3-5	124*	75.6
More than 5	2	1.2
Did not answer	6	3.6
Fruit group		
Less than 2	114	69.5
2-4	43*	26.3
More than 4	1	0.6
Did not answer	6	3.6

* Respondents consuming the correct number of servings recommended

If the consumption of vegetables and fruits are combined, however, then the Taiwanese students in this study met the 5-a-day as suggested by the USDA Food Guide Pyramid. The comparison of the mean consumption of the five food groups by students with the USDA Food Guide Pyramid and Taiwan's Healthy Food Guides is shown in Table 22. The mean consumption 6 servings of the "rice, cereal, bread, and pasta" group barely meets the number of recommended servings (6-11 servings) per day. The mean intake of the "meat, poultry, fish, and eggs" group was 2.84 servings which meets the USDA Food Guide Pyramid. In Taiwan, this food group includes the "milk, yogurt, and cheese" group. The number of recommended servings are 5 servings. There was a remarkably low consumption of milk and milk products (0.85 servings), which reflected also the low consumption of dairy products in Taiwan on a daily basis. One hundred and twenty six of the students reported that they increased milk consumption since coming to the U.S. (Table 17). The intake of vegetables (3.39 servings) was within the recommended number of servings which is 3-5, whereas the mean intake of fruits (1.58 servings) was slightly below the recommendation servings (2-4 servings) (Table 22).

TABLE 22

COMPARISONS OF MEAN DAILY FOOD CONSUMPTION OF RESPONDENTS WITH THE USDA FOOD GUIDE PYRAMID AND TAIWAN'S HEALTHY FOOD GUIDES

Food Group*	Mean Daily Consumption	The USDA Food Guides Pyramid	Taiwan Healthy Food Guides
Rice, cereal, bread, pasta	5.98 Servings	6-11 Servings	6-12 Servings or 3-6 Bowls
Meat, poultry, fish, eggs	2.84 Servings	2-3 Servings	5 Servings (Including milk)
Milk, yogurt, cheese	0.85 Servings	2-3 Servings	--
Vegetables	3.39 Servings	3-5 Servings	3-4 Servings
Fruits	1.58 Servings	2-4 Servings	2 Servings

* Definition of units:

(1) 1 bowl (240 cm^3) of rice or cereal = 2 servings;
(2) 1 slice of bread = 1 serving;
(3) 30g or 2-3 ounces of cooked lean meat, poultry, or fish = 1 serving;
(4) 1 egg = 1 serving;
(5) 1 cup (240cm^3) of milk or yogurt = 1 serving;
(6) 1 cup (240cm^3) of raw leafy vegetables or 75g cooked vegetables = 1 serving;
(7) 1 medium size of apple, banana, or orange = 1 serving;
(8) 3/4 cup (180cm^3) of fruit juice = 1 serving

Statistical Analysis and Testing of Hypotheses

American Food Preference Analysis

Hypothesis # 1 states: There will be no significant association between American food preferences of Taiwanese students in Oklahoma and the selected demographic variables. Preference categories for American foods were collapsed into well, no preferences, and not at all. Chi-square analysis was performed to determine if selected demographic variables of Taiwanese students were associated with American food preferences. Chi-square analysis indicated that the only one significant association at $p \leq 0.05$ was between gender and American food preferences (Table 23). Females tended to like American foods in Taiwan. Forty nine females reported that they liked American foods well, 29 females had no preferences, and only 3 females reported not liking American foods while living in Taiwan (Appendix C, Table 40). In contrast, 12 males did not like American foods in Taiwan, while 34 males reported liking American Foods. Upon arriving in the U.S., more females (N=12) reported that they did not like American foods, while more males (N=19) did not like American foods at all. Almost the same number of males (N=38) and females (N=37) had no preferences (Appendix D, Table 40).

Based on this one association, the researcher rejected hypothesis # 1 in part, however, there were no significant associations between eight other demographic variables and American food preferences, therefore, the researcher failed to reject hypothesis # 1. In addition, there were no significant associations between Taiwanese

students' preferences for specific American foods and selected demographic variables at the significant level $p \leq 0.05$ (Table 24). Based on these results, the researcher failed to reject hypothesis # 1.

TABLE 23

CHI-SQUARE ANALYSIS ON AMERICAN FOOD PREFERENCES ACCORDING TO GENDER OF RESPONDENTS

Dependent Variable	df	Chi-square Value	P
Preferences in Taiwan	2	9.057	0.011
Preferences in the U.S.	3	8.590	0.035

*Significant level at $p \leq 0.05$
(Refer to Appendix D, Tables 40 and 41)

TABLE 24

P VALUES FOR THE CHI-SQUARE ANALYSIS ON PREFERENCES FOR SPECIFIC AMERICAN FOODS AND THE SELECTED DEMOGRAPHIC VARIABLES

	Specific American Foods				
Demographic Variables	Steak	Fried chicken	Hamburger	Sandwiches	Pizza
Gender	0.197	0.408	0.226	0.254	0.319
Age	0.150	0.324	0.122	0.189	0.067
Major	0.171	0.146	0.109	0.255	0.221
Education level	0.138	0.072	0.241	0.325	0.211
Marital status	0.236	0.178	0.474	0.136	0.357
Number of family members	0.165	0.139	0.084	0.305	0.349
Length of time in U.S.	0.173	0.235	0.246	0.193	0.174
Place of residence	0.158	0.184	0.147	0.201	0.150
Where food is consumed	0.137	0.160	0.220	0.163	0.122

*Significant level at $p \leq 0.05$

TABLE 24 (Continued)

P VALUES FOR THE CHI-SQUARE ANALYSIS ON PREFERENCES FOR SPECIFIC AMERICAN FOODS AND SELECTED DEMOGRAPHIC VARIABLES

	Specific American Foods				
Demographic Variables	Breakfast Cereal	Salad	Cheese	Hot Dogs	French Fries
Gender	0.098	0.135	0.223	0.200	0.125
Age	0.182	0.140	0.159	0.151	0.178
Major	0.093	0.144	0.092	0.162	0.145
Education level	0.174	0.148	0.345	0.196	0.265
Marital status	0.293	0.383	0.336	0.104	0.092
Number of family members	0.214	0.151	0.069	0.188	0.219
Length of time in U.S.	0.182	0.077	0.239	0.233	0.146
Place of residence	0.101	0.156	0.155	0.230	0.297
Where food is consumed	0.356	0.415	0.143	0.177	0.267

*Significant level at $p \leq 0.05$

Health Knowledge

Hypothesis # 2 states: There will be no significant association between health knowledge of Taiwanese students in Oklahoma and selected demographic variables. Health knowledge was determined by students' responses to select hot or cold foods to maintain equilibrium, their awareness of the USDA Food Guide Pyramid, and knowledge of the number of servings of foods to be consumed daily based on the USDA Food Guide Pyramid. Appendix D, Table 42 and Table 43 show the relation between health knowledge of Taiwanese students with selected demographic variables. The length of time students have stayed in the U.S. had a significant association ($p=0.024$, Table 25) with the concept of selecting hot or cold foods to maintain equilibrium. The longer the stay in the U.S., the least likely the students selected hot or cold foods to maintain equilibrium (Appendix D, Table 42). When the students have been in the U.S. less than three years they were likely to select hot or cold foods to maintain equilibrium. Of 93 Students staying in the U.S. less than three years, 56 students indicated that they selected hot or cold foods to maintain equilibrium ($N=56$), while 37 students did not select hot or cold foods to maintain equilibrium. In contrast, of 71 students staying in the U.S. more than three years, 23 selected foods to maintain equilibrium, while 48 did not (Appendix D, Table 42). Significant association ($p=0.043$, Table 26) was found between the students awareness of the USDA Food Guide Pyramid and the number of family members staying in the same households. Of 111 students with no family members living in the same households, 34 students knew the USDA Food Guide Pyramid well,

while 77 did not have this same knowledge. Of 49 students with one or more family members living in the same households, 25 indicated that they were aware of the Food Guide Pyramid well, while 24 did not know about this guide (Appendix D, Table 43).

Based on two significant associations, the researcher rejected hypothesis # 2 in part, however, there were no significant associations between health knowledge and other demographic variables, therefore, the researcher failed to reject hypothesis # 2.

TABLE 25

CHI-SQUARE ANALYSIS ON SELECTING HOT OR COLD FOODS TO MAINTAIN EQUILIBRIUM ACCORDING TO LENGTH OF TIME IN THE U.S. OF RESPONDENTS

Dependent Variable	df	Chi-square Value	P
Length of Time in U.S.	5	12.890	0.024

*Significant level at $p \leq 0.05$
(Refer to Appendix D, Table 42)

TABLE 26

CHI-SQUARE ANALYSIS ON AWARE OF THE USDA FOOD GUIDE PYRAMID ACCORDING TO NUMBER OF FAMILY MEMBERS IN HOUSEHOLDS OF RESPONDENTS

Dependent Variable	df	Chi-square Value	P
Aware of The USDA Food Guide Pyramid	2	6.301	0.043

*Significant level at $p \leq 0.05$
(Refer to Appendix D, Table 43)

Western-Style Food Experiences

Hypothesis # 3 states: There will be no significant association between western-style food experiences of Taiwanese students in Oklahoma and selected demographic variables. Western-style food experiences included number of times students ate western-style foods in restaurants, and the restaurant types when students ate out in Taiwan and in the U.S. No significant association at the $p \leq 0.05$ level was found between the western-style food experiences of Taiwanese students and the selected demographic variables (Table 27). Therefore, the researcher failed to reject hypothesis # 3.

Food Buying Practices

Hypothesis # 4 states: There will be no significant association between food buying practices of Taiwanese students in Oklahoma and selected demographic variables. Food buying practices consisted of shopping experiences in oriental food markets and U.S. supermarkets, where they usually shop for oriental foods, and also the availability of Chinese foods. A chi-square analysis was performed to determine if the association was significant ($p \leq 0.05$) between food buying practices of Taiwanese students and selected demographic variables. No significant association at the $p \leq 0.05$ level was found (Table 28), therefore, the researcher failed to reject the hypothesis # 4.

TABLE 27

P VALUE FOR THE CHI-SQUARE ANALYSIS ON WESTERN-STYLE FOOD EXPERIENCES OF RESPONDENTS WITH THE SELECTED DEMOGRAPHIC VARIABLES

	Western-Style Food Experiences			
Demographic Variables	In Taiwan	In the U.S.	Eat Out in Taiwan	Eat Out In US.
Gender	0.136	0.215	0.235	0.322
Age	0.166	0.354	0.403	0.104
Major	0.381	0.247	0.636	0.328
Education level	0.278	0.325	0.218	0.233
Marital status	0.471	0.412	0.205	0.140
Number of family members	0.453	0.464	0.370	0.414
Length of time in U.S.	0.287	0.135	0.235	0.124
Place of residence	0.245	0.386	0.265	0.276
Where food is consumed	0.097	0.117	0.258	0.131

*Significant level at $p \leq 0.05$

TABLE 28

P VALUE FOR THE CHI-SQUARE ANALYSIS ON FOOD BUYING PRACTICES OF RESPONDENTS WITH DEMOGRAPHIC VARIABLES

	Food Buying Practices			
Demographic Variables	Shop in O.[1]	Shop in US.[2]	Where shop in O.[3]	Food Available[4]
Gender	0.249	0.367	0.290	0.116
Age	0.110	0.163	0.385	0.070
Major	0.109	0.253	0.275	0.143
Education level	0.348	0.152	0.139	0.079
Marital status	0.525	0.302	0.498	0.257
Number of family members	0.124	0.229	0.098	0.147
Length of time in U.S.	0.270	0.114	0.287	0.154
Place of residence	0.069	0.260	0.334	0.241
Where food is consumed	0.440	0.091	0.213	0.130

*Significant level at $p \leq 0.05$

[1] Shop in O.: Number of times per month students shopped in oriental food markets;
[2] Shop in US.: Number of times per month students shopped in US. supermarkets;
[3] Where Shop in O.: Where students usually shopped in oriental food markets;
[4] Food Available: The availability of Chinese foods in the area where respondents live.

Frequency of Food Consumption

Hypothesis # 5 states: There will be no significant association between frequency of food consumption of Taiwanese students in Oklahoma and selected demographic variables. One result showed that the frequency of rice consumption of Taiwanese

students was significantly associated with their age (p=0.019, Table 29). The majority of students had high frequency of rice consumption. Those who were under 25 years old consumed rice more frequently than those who were between 26-30 years old (Appendix D, Table 44). Sixty three of those in the age range of 26-30 consumed rice frequently. Twenty four students whose ages were above 30 claimed that they also consumed rice frequently (Appendix D, Table 44).

Consumption of hamburger/sandwiches was found to be significantly associated with where food is usually consumed by students (p=0.002, Table 30). Of the 132 students who usually eat meals at home, almost half of students (N=64) rarely or sometimes (N=60) consumed hamburger/sandwiches, while only 8 students consumed hamburger/sandwiches frequently (Appendix D, Table 45). Of the 16 students who ate meals at the residence halls, 5 each consumed hamburger/sandwiches frequently or sometimes, while 6 rarely consumed hamburger/sandwiches. Likewise, 5 out of 16 students who usually ate their meals at Student Union consumed hamburger/sandwiches frequently, whereas 4 consumed them sometimes and 7 consumed them rarely (Appendix D, Table 45).

Another variable which was significantly associated with where food is usually consumed was cooked vegetables (p=0.010, Table 30). Of the 132 students who usually consume their meals at home, the majority of students (N=95) consumed cooked vegetables frequently, while 23 ate cooked vegetables sometimes and 14 consumed them rarely (Appendix D, Table 46). Of the 16 students who usually ate meals at the residence halls, 7 each claimed that they ate cooked vegetables frequently or sometimes, while only

2 rarely ate cooked vegetables rarely. Seven of the 16 students who usually ate their meals at the Student Union consumed cooked vegetables frequently, 8 consumed them sometimes and only one ate cooked vegetables rarely (Appendix D, Table 46)

Based on these results, the researcher rejected the hypothesis # 5 in part, however. there were no significant associations between seven other demographic variables and frequency of food consumption, therefore, the researcher failed to reject hypothesis # 5.

TABLE 29

CHI-SQUARE ANALYSIS ON FREQUENCY OF DIETARY CONSUMPTION OF RICE IN THE U.S. ACCORDING TO AGE OF RESPONDENTS

Dependent Variable	df	Chi-square Value	P
Rice	4	11.750	0.019

*Significant level at $p \leq 0.05$
(Refer to Appendix D, Table 44)

TABLE 30

CHI-SQUARE ANALYSIS ON FREQUENCY OF CONSUMPTION OF HAMBURGER/SANDWICHES AND COOKED VEGETABLES IN THE U.S. ACCORDING TO WHERE FOOD IS USUALLY CONSUMED

Dependent Variable	df	Chi-square Value	P
Hamburger/sandwiches	4	17.208	0.002
Cooked vegetables	4	13.201	0.010

*Significant level at $p \leq 0.05$
(Refer to Appendix D, Tables 45 and 46)

Quantitative Changes of Food Consumption

Hypothesis # 6 states: There will be no significant association between quantitative changes of food consumption of Taiwanese students in Oklahoma and selected demographic variables. Chi-square analysis was used to determine if the significant association between each of the 49 food items and the selected demographic variables. Change in rice consumption was significantly associated ($p=0.030$) with gender of respondents (Table 31). More males increased intake of rice than females; 45 males increased rice consumption, while 38 reported that they decreased rice

consumption. In contrast, 28 females increased intake of rice and 55 decreased intake of rice (Appendix D, Table 47).

TABLE 31

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGES OF CONSUMPTION OF RICE, ORIENTAL INSTANT NOODLE, CANNED FRUITS, AND COFFEE ACCORDING TO GENDER OF RESPONDENTS

Dependent Variable	df	Chi-square Value	P
Rice	2	7.005	0.030
Oriental instant noodle	2	8.389	0.015
Canned fruits	3	10.880	0.012
Coffee	3	10.890	0.012

*Significant level at $p \leq 0.05$
(Refer to Appendix D, Tables 47, 48, 49, and 50)

Change in consumption of oriental instant noodle was significantly associated ($p=0.015$) with gender of respondents (Table 31). More females increased intake of oriental instant noodles compared to males. Of 81 females, more than half of students ($N=57$) ate more oriental instant noodles in the U.S. than in Taiwan, while 19 ate less and 5 had never eaten oriental instant noodles (Appendix D, Table 48). Of 83 males, 40

increased their intake, while 35 decreased their intake of oriental instant noodles (Appendix D, Table 48).

Canned fruits were also found to be significantly associated with gender of students (P=0.012, Table 31). Twenty five out of 83 males increased their intake of canned fruits, while 26 decreased consumption; 9 ate them only in the U.S., and 23 reported that they have never eaten canned fruits since coming to the U.S. (Appendix D, Table 49). In contrast, almost the same number of females (N=26) as males (N=25) increased their intake of canned fruits. Sixteen out of 81 females decreased their intake of canned fruits, while 24 ate them only in the U.S., and 15 indicated that they have never consumed them since coming to the U.S. (Appendix D, Table 49).

The other variable associated with the gender of students was coffee consumption (p=0.012, Table 31). More females (N=51) increased their intake of coffee than males (N=34). In contrast, more males (N=28) decreased their intake of coffee than females (N=11) (Appendix D, Table 50). Almost the same number of males (N=9) and females (N=8) reported that they had consumed coffee only in the U.S., whereas almost the same number of males (N=12) and females (N=11) indicated that they had never consumed coffee since coming to the U.S. (Appendix D, Table 50).

Ice cream consumption was found to be significantly associated with the education level of students (p=0.006, Table 32). Thirty seven out of 73 undergraduate students increased consumption of ice cream, while 26 decreased consumption of ice cream and 2 had never eaten ice cream in the U.S. (Appendix D, Table 51). Of the 91

graduate students, 68 increased their intake of ice cream, 17 decreased their intake, while 6 had never eaten ice cream (Appendix D, Table 51).

TABLE 32

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGES OF CONSUMPTION OF ICE CREAM, FROZEN VEGETABLES, WINE, AND BEER ACCORDING TO EDUCATION LEVEL OF RESPONDENTS

Dependent Variable	df	Chi-square Value	P
Ice Cream	2	10.183	0.006
Frozen Vegetables	3	9.430	0.024
Wine	3	8.339	0.039
Beer	3	16.480	0.001

*Significant level at $p \leq 0.05$
(Refer to Appendix D, Tables 51, 52, 53, and 54)

There was a significant association between frozen vegetables consumption and education level of students (p=0.024, Table 32). Of 73 undergraduate students, about one third increased their intake of frozen vegetables, another one third decreased their intake, while another one third ate this food item only in the U.S. Five claimed to have never eaten frozen vegetables (Appendix D, Table 52). Of 91 graduate students, 43 increased

their consumption of frozen vegetables, while 13 students decreased their intake of this food item. Twenty two graduate students only consumed them in the U.S., while 13 had never consumed frozen vegetables (Appendix D, Table 52).

Wine was also found to be significantly associated with education level (p=0.039, Table 32); 45 out of 73 undergraduate students reported that they had never consumed wine in the U.S., while 10 only drank wine upon arriving in the U.S. Twelve students decreased their intake of wine, while 6 increased their intake of wine (Appendix D, Table 53). Forty five of the 91 graduate students had never consumed wine, while 6 students had wine only in the U.S. In addition, 19 reported that they have consumed more wine in the U.S. than in Taiwan. In contrast, 21 students decreased their intake of wine since coming to the U.S. (Appendix D, Table 53).

Consumption of beer was significantly associated with education level (P=0.001, Table 32); 43 out of 73 undergraduate students had never tried beer, while 13 only tried beer in the U.S. Twelve reported that they decreased their intake of beer, while 5 increased their consumption of beer since coming to the U.S. (Appendix D, Table 54). Of 91 graduate students, 32 claimed that they decreased their intake of beer, 17 increased their intake of beer, while 7 students stated only tried beer in the U.S. (Appendix D, Table 54).

Poultry consumption was significantly associated with marital status of the respondents (p=0.001, Table 33). Of 135 single students, 68 stated that they decreased their consumption of poultry, while 31 increased their consumption of poultry. Almost the same number of students reported that they had never eaten poultry (N=19) or only

ate poultry in the U.S. (N=17) (Appendix D, Table 55); 16 out of 29 married students claimed that they increased intake of poultry, while 6 decreased their intake of poultry; 6 reported that they had never eaten poultry and 1 student ate poultry only since coming to the U.S. (Appendix D, Table 55).

TABLE 33

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGES OF CONSUMPTION OF POULTRY AND BEER ACCORDING TO MARITAL STATUS OF RESPONDENTS

Dependent Variable	df	Chi-square Value	P
Poultry	3	15.806	0.001
Beer	3	13.749	0.003

*Significant level at $p \leq 0.05$
(Refer to Appendix D, Tables 55 and 56)

Consumption of beer was significantly associated with the marital status of respondents (p=0.003, Table 33). Of 135 single students, almost half (N=69) had never consumed beer, while 20 only tried them in the U.S. Sixteen students, however, claimed to have increased beer consumption, while 30 others decreased their beer intake (Appendix D, Table 56). Of 29 married students, 14 decreased their intake of beer, while

6 increased their intake of beer, and 9 reported that they had never tasted beer (Appendix D, Table 56).

There was a significant association between quantitative change of pork consumption and number of family members in the household (p=0.006, Table 34). Of 112 students who had no family members living with them, more than half of students (N=63) reported that they decreased consumption of pork, while 46 increased pork intake and 3 had never eaten pork in the U.S. (Appendix D, Table 57). Thirty four out of 50 students who had one or more family members in their households increased their intake of pork, whereas 15 decreased pork intake and 4 had never eaten pork (Appendix D, Table 57).

TABLE 34

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGES OF CONSUMPTION OF PORK, ICE CREAM AND TOFU ACCORDING TO NUMBER OF FAMILY LIVE WITH RESPONDENTS

Dependent Variable	df	Chi-square Value	P
Pork	2	10.088	0.006
Ice cream	2	7.737	0.021
Tofu	2	7.194	0.027

*Significant level at $p \leq 0.05$
(Refer to Appendix D, Tables 57, 58, and 59)

Ice cream consumption was also significantly associated with number of family members in the household (p=0.021, Table 34). Sixty seven out of 112 students that had no family members in their households reported that they ate more ice cream in the U.S. than in Taiwan. In contrast, 36 decreased their ice cream intake and 9 had never consumed ice cream in the U.S. (Appendix D, Table 58). Thirty seven out of 50 students who had one or more family members with them reported that they increased their consumption of ice cream (Appendix D, Table 58).

Intake of tofu was also significantly associated with number of family members in the household (p=0.027, Table 34). Of 112 students with no family members in the household, 91 reported that they ate less tofu in the U.S. than in Taiwan. In contrast, 19 increased their intake of tofu and 2 had never eaten tofu in the U.S. (Appendix D, Table 59). Eighteen out of 50 students with family members in their households increased tofu consumption, while 31 decreased their consumption of tofu (Appendix D, Table 59).

There was a significant association between fresh vegetables and place of residence of students (p=0.011, Table 35). Sixty seven of the 125 students living in apartments increased their consumption of fresh vegetables, while 47 decreased their fresh vegetables intake. In contrast, 11 student had never consumed fresh vegetables in the U.S. (Appendix D, Table 60). Of 22 students living in houses, almost all (N=20) increased their intake of fresh vegetables. Ten out of 17 students living in residence halls reported that they ate more fresh vegetables in the U.S. than in Taiwan, four decreased their intake and three had never consumed fresh vegetables since coming to the U.S. (Appendix D, Table 60).

TABLE 35

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGES OF CONSUMPTION OF FRESH VEGETABLES AND CANNED FRUITS ACCORDING TO PLACE OF RESIDENCE OF RESPONDENT

Dependent Variable	df	Chi-square Value	P
Fresh vegetables	4	13.118	0.011
Canned fruits	6	13.087	0.042

*Significant level at $p \leq 0.05$
(Refer to Appendix D, Tables 60 and 61)

There was also a significant association between canned fruits and place of residence of (p=0.042, Table 35). Of 125 students living in apartments, almost the same number of students increased (N=34) and decreased (N=38) consumption of canned fruits, while 30 reported that they had never eaten canned fruits in the U.S. Only 23 claimed to have eaten canned fruits since coming to the U.S. (Appendix D, Table 61). Ten out of 22 students living in houses reported that they increased their intake of canned fruits, only one decreased intake and 7 had never eaten canned fruits. Seven of the 17 students living in residence halls increased their intake of canned fruits, 3 decreased consumption, while 6 only consumed them in the U.S. and 1 had never eaten canned fruits (Appendix D, Table 61).

A summary of significant associations between consumption of the 15 food items and selected demographic variables is presented in Table 36. Those results indicated that Taiwanese students actually changed their food consumption levels on various food items since living in the U.S. Based on these results, the researcher rejected hypothesis # 6 in part, however, there were no significant associations between food consumption and two other demographic variables. Based on those non-associations, the researcher failed to reject hypothesis # 6.

TABLE 36

SIGNIFICANT ASSOCIATION OF QUANTITATIVE CHANGES OF FOOD CONSUMPTION WITH DEMOGRAPHIC VARIABLES

Food Item	Significant with Demographic Variables	P Value
Protein Foods		
1. beef		
2. chicken		
3. pork	number of family members	0.006
4. poultry	marital status	0.001
5. fish/shellfish		
6. eggs		
7. processed meat		
Diary Products/Fats		
1. milk		
2. cheese		
3. ice cream*	education level	0.006
	number of family members	0.021
4. yogurt		
5. butter/margarine		
6. cooking oil		
7. lard		
Grains/Starches		
1. rice	gender	0.030
2. tofu	number of family members	0.027
3. bread/toast/muffins		
4. breakfast cereal		
5. hamburger/sandwiches		
6. noodle		
7. oriental instant noodle	gender	0.015
8. potato chips		
9. french fries		

TABLE 36 (Continued)

Food Item	Significance with Demographic Variables	P Value
Vegetables/Fruits		
1. fresh vegetables	place o residence	0.011
2. canned vegetables		
3. frozen vegetables	education level	0.024
4. fresh fruits		
5. canned fruits*	gender	0.012
	place of residence	0.042
6. frozen fruits		
Sauce/Seasoning		
1. soy sauce		
2. MSG		
3. Chinese spices		
4. salt/pepper		
5. salad dressing		
6. vinegar		
7. barbecue sauce		
8. ketchup		
9. ginger		
10. garlic		
Sweets/Beverages		
1. cookies/pies/cakes		
2. candies		
3. Chinese tea		
4. green tea		
5. black tea		
6. Coke/7-up, etc.		
7. wine	education level	0.039
8. beer*	education level	0.001
	marital status	0.003
9. coffee	gender	0.012

*Canned fruits, ice cream, and beer were significantly associated with two demographic variables

24-hour Dietary Recall

Hypothesis # 7 states: There will be no significant association between 24-hour dietary recall of Taiwanese students in Oklahoma and selected demographic variables. Analysis of the 24-hour dietary recall was based on the number of servings for different food groups as recommended by the USDA Food Guide Pyramid that students consumed per day. The 24-hour recall indicated foods consumed at breakfast, lunch, dinner, including snacks, and beverages. Chi-square analysis showed that "rice, cereal, bread, and pasta" group was significantly associated with gender of students ($p=0.007$, Table 37). More males than females consumed the correct number of servings (6-11 servings) recommended for this food group. Of 83 males, 59 consumed 6-11 servings and 24 consumed less than 6 servings of this food group. In contrast, of 81 females, almost half of the students consumed 6-11 servings (N=41), while the other half consumed less than 6 servings (N=40) of this food group (Appendix D, Table 62).

In addition, the food group "milk, yogurt, and cheese" was found to be significantly associated with place of residence of students ($p=0.003$, Table 38). Of the 125 students living in apartments, the majority of students (N=109) consumed less than 2 servings of this food group, while only 16 consumed 2-3 servings as recommended by the USDA Food Guide Pyramid (Appendix D, Table 63). Of 22 students living in houses, only 2 consumed the correct number of servings recommended for this food group, whereas 20 consumed less than 2 servings. Likewise, of 17 students living in the residence halls, 6 consumed 2-3 servings, while 10 consumed less than 2 servings. One

student living in the residence hall consumed more than 3 servings (Appendix D, Table 63).

Based on results presented in Tables 37 and 38, the researcher rejected hypothesis # 7 in part. The "rice, cereal, bread, and pasta" group was not significantly associated with seven other demographic variables and the "milk, yogurt, and cheese" group was not significantly associated with seven other demographic variables, hence, the researcher failed to reject hypothesis # 7. There were no significant associations between three other food groups and demographic variables, therefore, the researcher failed to reject the hypothesis # 7.

TABLE 37

CHI-SQUARE ANALYSIS ON CONSUMPTION OF RICE, CEREAL, BREAD, AND PASTA GROUP OF 24-HOUR DIETARY RECALL ACCORDING TO GENDER OF RESPONDENTS

Dependent Variable	df	Chi-square Value	P
Rice, cereal, bread, and pasta	1	7.217	0.007

*Significant level at $P \leq 0.05$
(Refer to Appendix D, Table 62)

TABLE 38

CHI-SQUARE ANALYSIS ON CONSUMPTION OF MILK, YOGURT, AND CHEESE GROUP OF 24-HOUR DIETARY RECALL ACCORDING TO PLACE OF RESIDENCE OF RESPONDENTS

Dependent Variable	df	Chi-square Value	P
Milk, yogurt, and cheese	4	15.890	0.003

*Significant level at $p \leq 0.05$
(Refer to Appendix D, Table 63)

The Relationship of Knowledge of The USDA Food Guide Pyramid and 24-Hour Dietary Recall

Hypothesis # 8 states: There will be no significant association between knowledge of the U.S. Food Guide Pyramid and 24-hour dietary recall of Taiwanese students in Oklahoma. Chi-square determination showed no significant associations ($p \leq 0.05$) between knowledge about the number of servings from each group in the USDA Food Guide Pyramid and foods consumed based on their 24-hour recall (Table 39), therefore, the researcher failed to reject hypothesis # 8.

TABLE 39

P VALUE FOR CHI-SQUARE ANALYSIS ON THE ASSOCIATION BETWEEN KNOWLEDGE OF THE USDA FOOD GUIDE PYRAMID AND 24-HOUR DIETARY RECALL OF RESPONDENTS

KNOWLEDGE OF FOOD GROUP	24-HOUR DIETARY RECALL	P
Rice, cereal, bread, and pasta	Rice, cereal, bread, and pasta	0.297
Meat, poultry, fish, and eggs	Meat, poultry, fish, and eggs	0.409
Milk, yogurt, and cheese	Milk, yogurt, cheese	0.713
Vegetable	Vegetable	0.077
Fruit	Fruit	0.862

*Significant level at $p \leq 0.05$

CHAPTER V

SUMMARY, RECOMMENDATIONS, AND IMPLICATIONS

There are a number of studies in the literature concerning immigrants' food habits, however, few have focused specifically on Taiwanese students. The purpose of this study was twofold: (1) to discuss the cultural background and food practices of Taiwanese students, and obtain in-depth information about changes in their dietary habits while living in the U.S., and (2) to determine the relationships among the students' personal characteristics, and their American food preferences, health knowledge, western-style food experiences, food buying practices, frequency of consumption of selected foods, quantitative changes in food consumption, and 24-hour dietary recall. Eight hypotheses were postulated to determine the relationships. The intent of this research was to demonstrate how Taiwanese students living in the U.S. change their food habits in order to accommodate in the different culture and if they maintain strong ties to native foods and traditional diets.

The review of literature included the major topics: (1) food and the establishment of food habits, (2) social and cultural aspects of food habits, (3) food, eating, and dietary habits in Taiwan, and (4) guides to healthful diets. The results of the data collected from

the questionnaires completed by Taiwanese students are presented in Chapter IV. The sample/population used in the study comprised of members of the Chinese Student Associations (Taiwan, CSA) at Oklahoma State University (N=76), University of Oklahoma (N=121), University of Central Oklahoma (N=190), and Oklahoma City University (N=195) listed in the spring 1995 student directories. Data obtained from 164 questionnaires were analyzed using frequencies, percentages, and chi-square test. The significance level accepted was $p \leq 0.05$.

Summary of Results

Characteristics of Survey Participants

Of the 164 respondents, 83 were males and 81 were females. The predominant age ranges of respondents were 26-30 years old (N=74) followed by 21-25 years old (N=56). Almost two-fifths of the students (N=69) were enrolled in the College of Business Administration followed by the College of Arts and Sciences (N=38). More than half of students (N=91) were graduate students. A large percentage of students (N=131) were single and the majority of students (N=112) had no family members living with them in Oklahoma. About one fourth of the students (N=44) have been in the U.S. for one to two years followed by two to three years (N=35). A large number of students lived in apartments (N=125), and almost four-fifths (N=132) of the students consumed their foods at home (Table 1).

Responses to Descriptive Questions and Others

Most of the students (N=148) did not cook the majority of their meals while living in Taiwan. In contrast, three-fourths (N=120, 73.6%) of the students cook the majority of meals while living in the U.S. (Table 2). A large number of students (N=115) perceived Chinese foods as having a higher nutritional value than American foods (Table 6). More than half of the students (N=85) stated that their health condition remained the same since coming to the U.S. Likewise, over half of the students (N=90) had gained weight, while 25 students had lost weight since coming to the U.S. (Table 7). While in the U.S., about 55% and 25% of the students ate breakfast 1-5 times and 6-7 times per week, respectively. While in Taiwan, 56.7% of the students ate breakfast 6-7 times per week (Table 8).

Almost half of the students (N=83) did not select "hot" or "cold" foods to maintain equilibrium (Table 3). About two-thirds of the students (63.1%, N=101) were not aware that the U.S. Food Guide Pyramid existed. Only 11 knew the Food Guide Pyramid very well (Table 4). A large number of students underestimated the number of servings needed for the "rice, cereal, bread, and pasta" group (N=96), the "milk, yogurt, and cheese" group (N=51), and the "vegetables" group (N=68). The "meat, poultry, fish, and eggs" group received the largest number of correct responses (N=70) relative to number of servings recommended, followed by the "fruits" group (N=64) (Table 5).

Half of the students (N=81) ate in western-style restaurants at least 1-3 times a week while in Taiwan. In contrast, 95 students ate in western-style restaurants 1-3 times

a week in the U.S. The majority of students (N=142) ate out in Chinese-style restaurants in Taiwan. Half of the students (N=82) ate out in American-style restaurants in the U.S., while 76 ate out in Chinese-style restaurants in the U.S. (Table 9). The majority of students (N=130) shopped in oriental food markets 1-3 times per month, while 76 and over half of the students (N=85) shopped in U.S. supermarkets 1-3 times and more than 3 times per week, respectively. The majority of students (N=143) shopped in oriental food markets in Oklahoma City (Table 11). Those (N=81) who reported that most of the Chinese foods were available in the areas where they lived obtained Chinese foods from oriental food markets in Oklahoma City/Tulsa (N=80) or from home in Taiwan (N=51). About one half of the students (N=83) stated that there were Chinese foods that were not always available. Traditional Taiwanese foods and fresh vegetables were the two items mentioned by most of students as foods not generally available where they live (Table 12).

American Food Preferences

Half of the students (N=83) reported that they liked American foods well in Taiwan, 58 students liked American foods well upon arriving in the U.S., while 68 liked American foods only since living in the U.S. (Table 10). The most preferred foods in the U.S. were fried chicken, steak, and salads, while the least favorite foods were breakfast cereals and cheese (Table 14).

Dietary Consumption of Specific Foods in The U.S. and Quantitative Changes of Food Consumption

On the dietary consumption of 15 specific U.S. food items, the first five food items commonly eaten by Taiwanese students were rice, cooked vegetables, eggs, fresh fruits, and chicken. In contrast, alcoholic beverages, breakfast cereal, and fish/shellfish were the food items that students consumed the least (Table 16).

The top 6 food items which students increased their consumption since coming to the U.S. were: chicken, milk, eggs, beef, Coke, and ice cream (Table 17). The top 5 food items that students decreased their consumption were: fish/shellfish, Chinese tea, Chinese spices, MSG, and rice (Table 18). Cheese and breakfast cereals were the top 2 food items that students had eaten only in the U.S. (Table 19), while wine and beer were the top 2 food items never consumed by students since coming to the U.S. (Table 20).

24-hour Dietary Recall

The 24-hour dietary recall analysis was based on the number of servings suggested by the USDA Food Guide Pyramid. The mean consumption of 6 servings for the "rice, cereal, bread, and pasta" group barely meets the recommended daily servings (6-11 servings) by the U.S. Food Guide Pyramid. The mean intake of the "meat, poultry, fish, and eggs" group was 2.84 servings which meets the recommended daily servings

(2-3 servings). The intake of vegetables (3.39 servings) was within the recommended number of servings which is 3-5. There was a low consumption of the "milk, yogurt, and cheese" group (0.85 serving), while the mean intake of fruits (1.58 servings) was below the recommendation servings (2-4 servings). The combined consumption of vegetables and fruits, however, met the 5-a-day suggested by the USDA Food Guide Pyramid (Table 22).

Testing of Hypotheses

The results of chi-square analysis identified a significant association at the $p \leq 0.05$ between American food preferences and gender of Taiwanese students (Table 23). A significant association at $p \leq 0.05$ level was also found between health knowledge and students' marital status, length of time in the U.S., and number of family members in households (Table 25, 26). There were significant associations between frequency of dietary consumption of rice, hamburger/sandwiches, cooked vegetables and students' gender, and where food is usually consumed. Additionally, there was a significant association between quantitative changes of consumption of 15 food items and the selected demographic variables (Table 36). And, 24-hour dietary recall for the "rice, cereal, bread, and pasta" group and the "milk, yogurt, and cheese" group were significantly associated with students' gender and place of residence (Table 37 and 38).

Recommendations

Research Instrument

1. Response rate may have been increased with a second mailing, which was not done in this study.

2. The research instrument covered broad areas and the questionnaire was lengthy. Perhaps a shorter questionnaire may have yielded more response from students.

3. The time when the questionnaires were distributed should be coordinated with the time when the student directories are published, otherwise change in addresses or graduation will affect the response rate.

Additional Research

1. There is a need to conduct nationwide studies to discover food habits and food preferences of Taiwanese adolescents in the U.S. With the increased attraction to American foods and customs among Taiwanese adolescents, their dietary habits may differ from those of college students.

2. Study other groups of international students in terms of food habits, knowledge, attitudes, and dietary changes, and compare with results in this study.

3. Interview subjects and take a 3-day food record including a weekend day instead of a 24-hour recall in order to assess average intake.

Implications

Research-based data synthesized in Chapter II and results of this study clearly indicate that cultural factor has a great influence on the perceptions of foods and the individual's food habits. Each culture has its food acceptability and their particular cuisine. Food habits may change, however, for individuals or new ethnic groups arriving in a new country (Story and Harris, 1989). This study reflects the dietary change process occurring among Taiwanese students studying in Oklahoma: 114 out of 164 students reported that they changed dietary habits since coming to the U.S. More and more American foods are substituted for Chinese foods. Eight out of the top 20 food items which students increased their consumption since coming to the U.S. are typical American foods. The non-availability of some kinds of Chinese foods is one of the reasons to consume more American foods for Taiwanese students living in Oklahoma. In addition, the acceptance of new foods is one of the important factors contributing to change in dietary habits. For example, 63 students consumed cheese and 49 students reported that they consumed breakfast cereals only since coming to the U.S.

Eating a variety of foods in moderate amounts is the key to maintain optimal health. There was a lack of knowledge about the USDA Food Guide Pyramid for Taiwanese students studying in Oklahoma. About two thirds of the students (N=101) were not aware that the U.S. Food Guide Pyramid existed. Some students may not be familiar with a wide variety of available foods and may have a more limited dietary intake. There was a low consumption of the "milk and milk products" group (0.85

servings). When the Taiwanese students study in the U.S. and they have to make food choices, they need be aware of the relationship between adequate nutrition and good health. Nutrition educators need to provide nutrition materials for Taiwanese and other international students living in the U.S. campuses. The nutrition materials could aid in establishing a more comprehensive understanding of the interrelationships among health knowledge, attitudes toward food, and dietary behavior. In addition, nutrition educators need to identify barriers contributing to low consumption of milk and milk products and find creative ways to help students consumed the recommended number of servings. "Easy-to-follow" food preparation techniques should be made available to all international students so that they can adopt new foodways in this new environment. Moreover, the information concerning food preferences of Taiwanese students in this study may be found useful by dietitians/nutritionists responsible for planning menus in residence halls and Student Union foodservices thereby providing a wide variety of foods from the different food groups so that students can maintain optimum health through balanced diets.

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APPENDIXES

APPENDIX A

CORRESPONDENCE

Oklahoma State University

COLLEGE OF HUMAN ENVIRONMENTAL SCIENCES

Department of Nutritional Sciences
Stillwater, Oklahoma 74078-0337
425 Human Environmental Sciences
405-744-5040

Dear Student:

Congratulations! You have been chosen to participate in a very important study entitled **"Food Habits, Health Knowledge and Dietary Changes of Taiwanese Students in Oklahoma".** There are more than 30,000 Taiwanese students studying in America. Since arriving in the U.S., Taiwanese students have to make changes or adjustments in their traditions, customs, and life-style. Those who prefer to consume traditional Chinese food may have had a cultural shock in their dining experiences in the U.S. Thus, they may have to struggle to retain their foodways.

The attached questionnaire focuses on your food habits and dietary changes since you have come to the U.S. Please take 15 minutes of your time to complete the questionnaire. **Your cooperation and participation are very much appreciated**. Once the questionnaire is completed, please put it in the self-addressed, prepaid envelope provided and mail **at your earliest convenience on or before September 25, 1995**. Participation is strictly voluntary and there will be no penalty for non-participation.

Thank you for your time and willingness to participate in this study. Receiving your views is extremely important to the outcome of this study. If you have any question or need further assistance, please call us at **(405) 744-8294**. We will look forward to hearing from you soon.

Sincerely,

Pai-ching Kuo
Graduate Student

Lea L. Ebro, Ph.D., RD/LD
Professor & Dietetic Internship Director

APPENDIX B

RESEARCH INSTRUMENT

Food Habits, Health Knowledge and Dietary Changes Survey for Taiwanese Students in Oklahoma

Section I.

Directions: Please check or fill in the appropriate information.

1. Gender: (1) ___ Male (2) ___ Female
2. Age: (1)___ under 20 (2)___ 21-25 (3)___26-30 (4)___31-35 (5)___ above 36
3. What's your major? _____
4. Education level: (1)___ Undergraduate (2)___ Graduate
5. Marital Status: (1)___ Single (2)___ Married (3)___ Other
6. How many family members live with you in Oklahoma? _____
7. How long have you been in the U.S.? _____ years _____ months
8. Where do you live now? (1)___ Apartment (2)___ House (3)___ Residence Hall
9. Where do you usually eat your meals?
   (1)___ Student Union (2)___ Residence Hall Cafeteria (3)___ Home
   (4)___ Other, please specify _____
10. While you were in Taiwan, did you cook the majority of meals by yourself?
    (1) ___ Yes (2)___ No
11. Do you cook the majority of meals by yourself in the U.S.? (1)___ Yes (2)___No
12. Do you believe and practice the concept of selecting "hot" or "cold" foods to maintain equilibrium? (1)___ Yes (2)___ No
13. How well do you know the U.S. "Food Guide Pyramid"?
    (1)___ Very well (2)___ Fairly well (3)___ Not at all
14. **How many servings** does a healthful diet include in your typical meals per day?
    (1)_____ Servings for "rice, cereal, bread, and pasta" group.
    (2)_____ Servings for "fats, oils" group.
    (3)_____ Servings for "meat, poultry, fish, and eggs" group.
    (4)_____ Servings for "milk, yogurt, and cheese" group.
    (5)_____ Servings for "vegetable" group.
    (6)_____ Servings for "fruit" group.
15. Which kind of food has a higher nutritional value?
    (1)___ Chinese food
    (2)___ American food
    (3)___ Others, please specify _____
16. How do you feel about your health condition since coming to the U.S?
    (1)___ Improved (2)___ Worse (3)___ The same
17. Have you gained or lost any weight since coming to the U.S?
    (1)___ Yes, I had gained _____ kg or _____ pounds
    (2)___ Yes, I had lost _____ kg or _____ pounds
    (3)___ No, my weight is the same
18. Have you changed your dietary habits and consume more western style foods since arriving in the U.S? (1)___ Yes (2)___ No

Please continue .....

19. How many times a week did you eat breakfast while you were in Taiwan?
    (1)___ 0 (2)___ 1-3 (3)___ 4-5 (4)___ 6-7
20. How many times a week do you eat breakfast in the U.S.?
    (1)___ 0 (2)___ 1-3 (3)___ 4-5 (4)___ 6-7
21. How many times a week did you eat in western style restaurants(**including American fast food restaurants**) while you were in Taiwan?
    (1)___ 0 (2)___ 1-3 (3)___ 4-6 (4)___ over 7
22. While in the U.S., how many times a week do you eat in western style restaurants? (**including American fast food restaurants**)
    (1)___ 0 (2)___ 1-3 (3)___ 4-6 (4)___ over 7
23. While in Taiwan, you ate out mostly in a
    (1)___ Chinese style restaurant
    (2)___ American style restaurant
    (3)___ Others, please specify _____
24. While in the U.S., you eat out mostly in a
    (1)___ Chinese style restaurant
    (2)___ American style restaurant
    (3)___ Others, please specify _____
25. How well did you like American foods while you were in Taiwan?
    (1)___ very well (2)___ fairly well (3)___ no preference (4)___ not at all
26. Did you like American foods when you first time came to the U.S.?
    (1)___ very well (2)___ fairly well (3)___ no preference (4)___ not at all
27. Do you like American foods now?
    (1)___ very well (2)___ fairly well (3)___ no preference (4)___ not at all
28. How many times a month do you shop in an oriental food market?
    (1)___ 0 (2)___ 1-3 (3)___ 4-6 (4)___ over 7
29. Where do you usually shop in oriental food markets?
    (1)___ Stillwater (2)___ Edmond (3)___ OKC (4)___ Tulsa
    (5)___ Dallas (6)___ Other, please specify _____
30. How many times a month do you shop in a U.S. supermarket?
    (1)___ 0 (2)___ 1-3 (3)___ 4-6 (4)___ over 7
31. Are there any Chinese foods that are **not available** in the area where you live now?
    (1)___ Yes (2)___ No
    If yes, please describe these foods that are **not available**. _____

    _____

    _____

    If no, how do you obtain them?
    (1)___ Shop in OKC/Tulsa (2)___ Shop in Dallas (3)___ From home in Taiwan
    (4)___ Order by mail (5)___ From friends
    (6)___Other, please specify_____

Please continue to the next two sections.

Section II.

A. For each of the following foods, please rate **each food** using the scale from 1(never eaten) to 4 (like) to describe your preferences for specific American foods.

1.....2.....3.....4

Never eaten Dislike Accept Like

___ 1. steak
___ 2. fried chicken
___ 3. hamburger
___ 4. sandwiches
___ 5. pizza
___ 6. breakfast cereal
___ 7. salad
___ 8. cheese
___ 9. hot dogs
___ 10. french fries

B. For each of the following foods, please rate **each food** using the scale from 1 (never) to 4 (frequent) to describe your frequency of dietary consumption of selected foods in the U.S.

1.....2.....3.....4

never rarely (1-3 times per month) sometimes (1-3 times per week) frequent (more than 3 times per week)

___ 1. beef
___ 2. chicken
___ 3. pork
___ 4. fish/shellfish
___ 5. egg
___ 6. milk
___ 7. rice
___ 8. breakfast cereal
___ 9. hamburger/sandwiches
___ 10. noodle
___ 11. cooked vegetables
___ 12. fresh vegetables
___ 13. fresh fruits
___ 14. coffee, tea, coke, etc.
___ 15. alcoholic beverage

C. For each of the following foods, please rate **each food** using the scale from 1 (never eat) to 4 (eat more) to describe your consumption of food **since you coming to the U.S.**

1.....2.....3.....4

Never eat Eat only since coming to the U.S. Eat less Eat more

Protein foods

___ 1. beef
___ 2. chicken
___ 3. pork
___ 4. poultry
___ 5. fish/shellfish
___ 6. egg
___ 7. processed meat (bacon, ham, hot dog, etc.)

Diary products/fats

___ 1. milk
___ 2. cheese
___ 3. ice cream
___ 4. yogurt
___ 5. butter/margarine
___ 6. cooking oil
___ 7. lard

Please continue .....

1	2	3	4
Never eat	**Eat only since coming to the U.S.**	**Eat less**	**Eat more**

Grains/starches

___ 1. rice
___ 2. tofu
___ 3. bread/toast/muffins
___ 4. breakfast cereals
___ 5. hamburger/sandwiches
___ 6. noodle (including spaghetti, macaroni, etc.)
___ 7. oriental instant noodle
___ 8. potato chips
___ 9. french fries

Vegetables/fruits

___ 1. fresh vegetables
___ 2. canned vegetables
___ 3. frozen vegetables
___ 4. fresh fruits
___ 5. canned fruits
___ 6. frozen fruits

Sauce/seasoning

___ 1. soy sauce
___ 2. MSG
___ 3. Chinese spices
___ 4. salad dressing
___ 5. salt
___ 6. pepper
___ 7. vinegar
___ 8. barbecue sauce
___ 9. ketchup
___ 10. ginger
___ 11. garlic

Sweets/beverage

___ 1. cookies/pies/cakes
___ 2. candies
___ 3. Chinese tea
___ 4. green tea
___ 5. black tea
___ 6. coke/7-up, etc.
___ 7. wine
___ 8. beer
___ 9. coffee

Section III. Please recall what you had for your meals **yesterday** (Include amounts eaten). For example: one bowl of rice, two eggs, etc.(In English or Chinese)

Breakfast:

_____

Lunch:

_____

Dinner:

_____

Snacks and beverages:

Thank you very much for your time and assistance!!

APPENDIX C

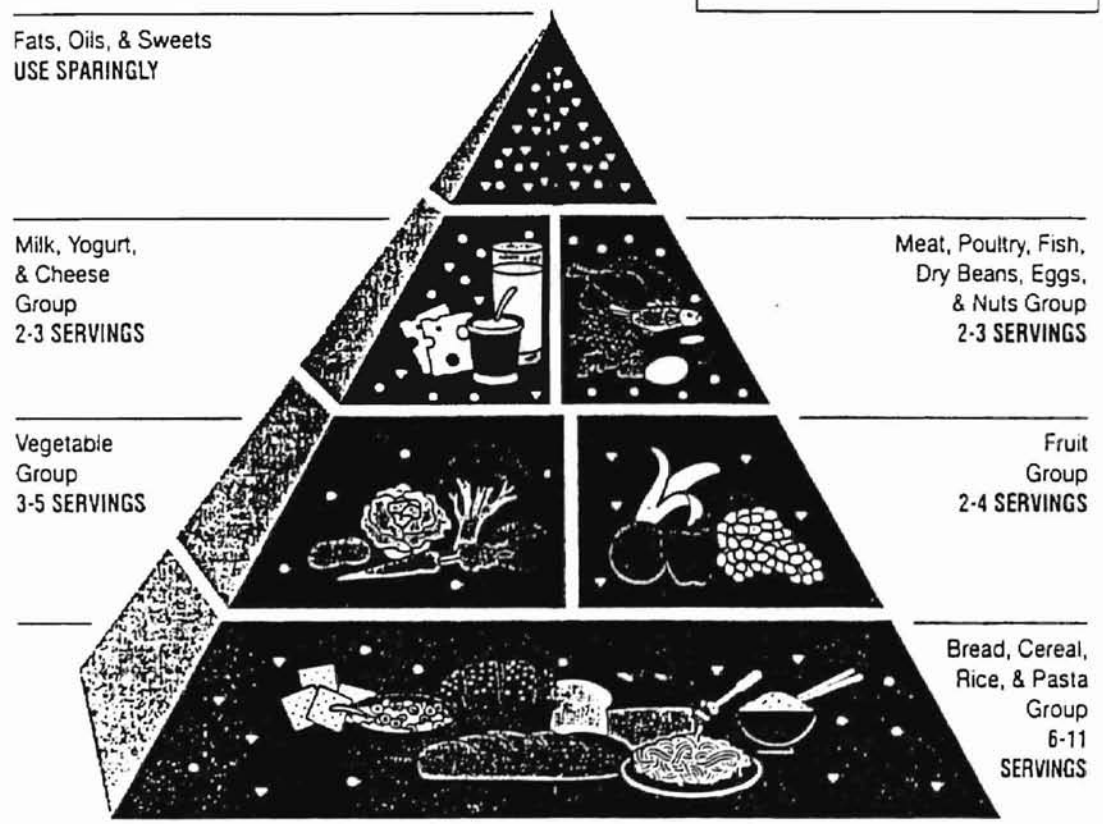
THE USDA FOOD GUIDE PYRAMID

The Food Guide Pyramid

A Guide to Daily Food Choices

KEY
- Fat (naturally occurring and added)
- Sugars (added)

These symbols show fats, oils, and added sugars in foods.



APPENDIX D

CHI-SQUARE ANALYSIS TABLES

TABLE 40

CHI-SQUARE ANALYSIS ON RESPONDENTS' AMERICAN FOOD PREFERENCES IN TAIWAN ACCORDING TO GENDER OF RESPONDENTS

	American Food Preferences		
Gender	Well	No Preferences	Not At All
Male (N=83)			
Frequency	34	37	12
Expected	42.006	33.402	7.5915
Percent	20.73	22.56	7.32
Female (N=81)			
Frequency	49	29	3
Expected	40.94	32.598	7.4085
Percent	29.88	17.68	1.83
Total	83	66	15
	50.61(%)	40.24(%)	9.15(%)

*Significant association at p = 0.011

TABLE 41

CHI-SQUARE ANALYSIS ON AMERICAN FOOD PREFERENCES WHEN RESPONDENTS ARRIVING IN THE U.S. ACCORDING TO GENDER OF RESPONDENTS

	American Food Preferences		
Gender	Well	No Preferences	Not At All
Male (N=83)			
Frequency	26	38	19
Expected	29.354	37.957	15.689
Percent	15.85	23.17	11.59
Female (N=81)			
Frequency	32	37	12
Expected	28.646	37.043	15.311
Percent	19.51	22.56	7.32
Total	58	75	31
	35.37(%)	45.73(%)	18.90(%)

*Significant association at $p = 0.035$

TABLE 42

CHI-SQUARE ANALYSIS ON SELECTING HOT OR COLD FOODS ACCORDING TO LENGTH OF TIME IN THE U.S. OF RESPONDENTS

Length of Time	Selecting	Not Selecting
Less than 1 year (N=14)		
Frequency	8	6
Expected	6.7439	7.2561
Percent	4.88	3.66
1 - 2 years (N=44)		
Frequency	28	16
Expected	21.195	22.805
Percent	17.07	9.76
2 - 3 years (N=35)		
Frequency	20	15
Expected	16.86	18.14
Percent	12.20	9.15
3 - 4 years (N=31)		
Frequency	10	21
Expected	14.933	16.067
Percent	6.10	12.80
4 - 5 years (N=16)		
Frequency	5	11
Expected	7.7073	8.2927
Percent	3.05	6.71
More than 5 years (N=24)		
Frequency	8	16
Expected	11.561	12.439
Percent	4.88	9.76
Total	79	85
	48.17(%)	51.83(%)

*Significant association at p = 0.024

TABLE 43

CHI-SQUARE ANALYSIS ON AWARE OF THE USDA FOOD GUIDE PYRAMID ACCORDING TO NUMBER OF FAMILY MEMBERS IN HOUSEHOLD

	Aware of the USDA Food Guide Pyramid		
Number of Family Members	Very Well	Fairly Well	Not At All
None (N=111)			
Frequency	7	27	77
Expected	7.6312	33.3	70.069
Percent	4.37	16.87	48.13
One or More (N=49)			
Frequency	4	21	24
Expected	3.3687	14.7	30.931
Percent	2.50	13.13	15.00
Total	11	48	101
	6.87(%)	30.00(%)	63.13(%)

*Significant association at p = 0.043

TABLE 44

CHI-SQUARE ANALYSIS ON FREQUENCY OF DIETARY CONSUMPTION OF RICE ACCORDING TO AGE OF RESPONDENTS

	Rice		
Age	Rarely	Sometimes	Frequent
Under 25 (N=62)			
Frequency	11	12	39
Expected	6.0488	8.3171	47.634
Percent	6.71	7.32	23.78
26-30 (N=74)			
Frequency	4	7	63
Expected	7.2195	9.9268	56.854
Percent	2.44	4.27	38.41
Above 30 (N=28)			
Frequency	1	3	24
Expected	2.7317	3.7561	21.512
Percent	0.61	1.83	14.63
Total	16	22	126
	9.76(%)	13.41(%)	76.83(%)

*Significant association at p = 0.019

TABLE 45

CHI-SQUARE ANALYSIS ON FREQUENCY OF CONSUMPTION OF HAMBURGER/SANDWICHES ACCORDING TO WHERE FOOD IS USUALLY CONSUMED

	Hamburger/Sandwiches		
Where Food is Usually Consumed	Rarely	Sometimes	Frequent
Residence Hall (N=16)			
Frequency	6	5	5
Expected	7.5122	6.7317	1.7561
Percent	3.66	3.05	3.05
Home (N=132)			
Frequency	64	60	8
Expected	61.976	55.537	14.488
Percent	39.02	36.59	4.88
Student Union (N=16)			
Frequency	7	4	5
Expected	7.5122	6.7317	1.7561
Percent	4.27	2.44	3.05
Total	77	69	18
	46.95(%)	42.07(%)	10.98(%)

*Significant association at p = 0.002

TABLE 46

CHI-SQUARE ANALYSIS ON FREQUENCY OF CONSUMPTION OF COOKED VEGETABLES ACCORDING TO WHERE FOOD IS USUALLY CONSUMED

	Cooked Vegetables		
Where Food is Usually Consumed	Rarely	Sometimes	Frequent
Residence Hall (N=16)			
Frequency	2	7	7
Expected	1.6585	3.7073	10.634
Percent	1.22	4.27	4.27
Home (N=132)			
Frequency	14	23	95
Expected	13.683	30.585	87.732
Percent	8.54	14.02	57.93
Student Union (N=16)			
Frequency	1	8	7
Expected	1.6585	3.7073	10.634
Percent	0.61	4.88	4.27
Total	17	38	109
	10.37(%)	23.17(%)	66.46(%)

*Significant association at $p = 0.010$

TABLE 47

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGE OF CONSUMPTION OF RICE ACCORDING TO GENDER OF RESPONDENTS

	Rice	
Gender	Eat Less	Eat More
Male (N=83)		
Frequency	38	45
Expected	46.055	36.439
Percent	23.17	27.44
Female (N=81)		
Frequency	53	28
Expected	44.945	35.561
Percent	32.32	17.07
Total	91	73
	55.49(%)	44.51(%)

*Significant association at p = 0.030

TABLE 48

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGE OF CONSUMPTION OF ORIENTAL INSTANT NOODLE ACCORDING TO GENDER OF RESPONDENTS

	Oriental Instant Noodle		
Gender	Never Eat	Eat Less	Eat More
Male (N=83)			
Frequency	8	35	40
Expected	6.5793	27.329	49.091
Percent	4.88	21.34	24.39
Female (N=81)			
Frequency	5	19	57
Expected	6.4207	26.671	47.909
Percent	3.05	11.59	34.76
Total	13	54	97
	7.93(%)	32.93(%)	59.15(%)

*Significant association at p = 0.015

TABLE 49

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGE OF CONSUMPTION OF CANNED FRUITS ACCORDING TO GENDER OF RESPONDENTS

	Canned Fruits			
Gender	Never Eat	Eat Only in The U.S.	Eat Less	Eat More
Male (N=83)				
Frequency	23	9	26	25
Expected	19.232	16.701	21.256	25.811
Percent	14.02	5.49	15.85	15.24
Female (N=81)				
Frequency	15	24	16	26
Expected	18.768	16.299	20.744	25.189
Percent	9.15	14.63	9.76	15.85
Total	38	33	42	51
	23.17(%)	20.12(%)	25.61(%)	31.10(%)

*Significant association at p = 0.012

TABLE 50

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGE OF CONSUMPTION OF COFFEE ACCORDING TO GENDER OF RESPONDENTS

	Coffee			
Gender	Never Eat	Eat Only in The U.S.	Eat Less	Eat More
Male (N=83)				
Frequency	12	9	28	34
Expected	11.64	8.6037	19.738	43.018
Percent	7.32	5.49	17.07	20.73
Female (N=81)				
Frequency	11	8	11	51
Expected	11.36	8.3963	19.262	41.982
Percent	6.71	4.88	6.71	31.10
Total	23	17	39	85
	14.02(%)	10.37(%)	23.78(%)	51.83(%)

*Significant association at p = 0.012

TABLE 51

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGE OF CONSUMPTION OF ICE CREAM ACCORDING TO EDUCATION LEVEL OF RESPONDENTS

		Ice Cream	
Education Level	Never Eat	Eat Less	Eat More
Undergraduate (N=73)			
Frequency	10	26	37
Expected	7.122	19.14	46.738
Percent	6.10	15.85	22.56
Graduate (N=91)			
Frequency	6	17	68
Expected	8.878	23.86	58.262
Percent	3.66	10.37	41.46
Total	16	43	105
	9.76(%)	26.22(%)	64.02(%)

*Significant association at $p = 0.006$

TABLE 52

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGE OF CONSUMPTION OF FROZEN VEGETABLES ACCORDING TO EDUCATION LEVEL OF RESPONDENTS

	Frozen Vegetables			
Education Level	Never Eat	Eat Only in The U.S.	Eat Less	Eat More
Undergraduate (N=73)				
Frequency	5	25	20	23
Expected	8.0122	20.921	14.689	29.378
Percent	3.05	15.24	12.20	14.02
Graduate (N=91)				
Frequency	13	22	13	43
Expected	9.9878	26.079	18.311	36.622
Percent	7.93	13.41	7.93	26.22
Total	18	47	33	66
	10.98(%)	28.66(%)	20.12(%)	40.24(%)

*Significant association at p = 0.024

TABLE 53

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGE OF CONSUMPTION OF WINE ACCORDING TO EDUCATION LEVEL OF RESPONDENTS

	Wine			
Education Level	Never Eat	Eat Only in The U.S.	Eat Less	Eat More
Undergraduate (N=73)				
Frequency	45	10	12	6
Expected	40.061	7.122	14.689	11.128
Percent	27.44	6.10	7.32	3.66
Graduate (N=91)				
Frequency	45	6	21	19
Expected	49.939	8.878	18.311	13.872
Percent	27.44	3.66	12.80	11.59
Total	90	16	33	25
	54.88(%)	9.76(%)	20.12(%)	15.24(%)

*Significant association at p = 0.039

TABLE 54

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGE OF CONSUMPTION OF BEER ACCORDING TO EDUCATION LEVEL OF RESPONDENTS

	Beer			
Education Level	Never Eat	Eat Only in The U.S.	Eat Less	Eat More
Undergraduate (N=73)				
Frequency	43	13	12	5
Expected	34.72	8.9024	19.585	9.7927
Percent	26.22	7.93	7.32	3.05
Graduate (N=91)				
Frequency	35	7	32	17
Expected	43.28	11.098	24.415	12.207
Percent	21.34	4.27	19.51	10.37
Total	78	20	44	22
	47.56(%)	12.20(%)	26.83(%)	13.41(%)

*Significant association at p = 0.001

TABLE 57

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGE OF CONSUMPTION OF PORK ACCORDING TO NUMBER OF FAMILY NUMBERS IN HOUSEHOLD

	Pork		
Number of Family Member	Never Eat	Eat Less	Eat More
None (N=112)			
Frequency	3	63	46
Expected	2.7654	53.926	55.309
Percent	1.85	38.89	28.40
One or More (N=50)			
Frequency	1	15	34
Expected	1.2346	24.074	24.691
Percent	0.62	9.26	20.99
Total	4	78	80
	2.47(%)	48.15(%)	49.38(%)

*Significant association at $p = 0.006$

TABLE 55

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGE OF CONSUMPTION OF POULTRY ACCORDING TO MARITAL STATUS OF RESPONDENTS

	Poultry			
Marital Status	Never Eat	Eat Only in The U.S.	Eat Less	Eat More
Single (N=135)				
Frequency	19	17	68	31
Expected	20.579	14.817	60.915	38.689
Percent	11.59	10.37	41.46	18.90
Married (N=29)				
Frequency	6	1	6	16
Expected	4.4207	3.1829	13.085	8.311
Percent	3.66	0.61	3.66	9.76
Total	25	18	74	47
	15.24(%)	10.98(%)	45.12(%)	28.66(%)

*Significant association at p = 0.001

TABLE 56

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGE OF CONSUMPTION OF BEER ACCORDING TO MARITAL STATUS OF RESPONDENTS

	Beer			
Marital Status	Never Eat	Eat Only in The U.S.	Eat Less	Eat More
Single (N=135)				
Frequency	69	20	30	16
Expected	64.207	16.463	36.22	18.11
Percent	42.07	12.20	18.29	9.76
Married (N=29)				
Frequency	9	0	14	6
Expected	13.793	3.5366	7.7805	3.8902
Percent	5.49	0.00	8.54	3.66
Total	78	20	44	22
	47.56(%)	12.20(%)	26.83(%)	13.41(%)

*Significant association at p = 0.003

TABLE 57

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGE OF CONSUMPTION OF ICE CREAM ACCORDING TO NUMBER OF FAMILY MEMBERS IN HOUSEHOLD

	Ice Cream		
Number of Family Members	Never Eat	Eat Less	Eat More
None (N=112)			
Frequency	9	36	67
Expected	11.062	29.037	71.901
Percent	5.56	22.22	41.36
One or More (N=50)			
Frequency	7	6	37
Expected	4.9383	12.963	32.099
Percent	4.32	3.70	22.84
Total	16	42	104
	9.88(%)	25.93(%)	64.20(%)

*Significant association at p = 0.021

TABLE 59

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGE OF CONSUMPTION OF TOFU ACCORDING TO NUMBER OF FAMILY MEMBERS IN HOUSEHOLD

	Tofu		
Number of Family Members	Never Eat	Eat Less	Eat More
None (N=112)			
Frequency	2	91	19
Expected	2.0741	84.346	25.58
Percent	1.23	56.17	11.73
One or More (N=50)			
Frequency	1	31	18
Expected	0.9259	37.654	11.42
Percent	0.62	19.14	11.11
Total	3	122	37
	1.85(%)	75.31(%)	22.84(%)

*Significant association at p = 0.027

TABLE 60

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGE OF CONSUMPTION OF FRESH VEGETABLES ACCORDING TO PLACE OF RESIDENCE OF RESPONDENTS

	Fresh Vegetables		
Place of Residence	Never Eat	Eat Less	Eat More
Apartment (N=125)			
Frequency	11	47	67
Expected	11.433	39.634	73.933
Percent	6.71	28.66	40.85
House (N=22)			
Frequency	1	1	20
Expected	2.0122	6.9756	13.012
Percent	0.61	0.61	12.20
Residence Hall (N=17)			
Frequency	3	4	10
Expected	1.5549	5.3902	10.055
Percent	1.83	2.44	6.10
Total	15	52	97
	9.15(%)	31.71(%)	59.15(%)

*Significant association at $p = 0.011$

TABLE 61

CHI-SQUARE ANALYSIS ON QUANTITATIVE CHANGE OF CONSUMPTION OF CANNED FRUITS ACCORDING TO PLACE OF RESIDENCE OF RESPONDENTS

	Canned Fruits			
Place of Residence	Never Eat	Eat Only in The U.S.	Eat Less	Eat More
Apartment (N=125)				
Frequency	30	23	38	34
Expected	28.963	25.152	32.012	38.872
Percent	18.29	14.02	23.17	20.73
House (N=22)				
Frequency	7	4	1	10
Expected	5.0976	4.4268	5.6341	6.8415
Percent	4.27	2.44	0.61	6.10
Residence Hall (N=17)				
Frequency	1	6	3	7
Expected	3.939	3.4207	4.3537	5.2866
Percent	0.61	3.66	1.83	4.27
Total	38	33	42	51
	23.17(%)	20.12(%)	25.61(%)	31.10(%)

*Significant association at p = 0.042

TABLE 62

CHI-SQUARE ANALYSIS ON CONSUMPTION OF RICE, CEREAL, BREAD, AND PASTA GROUP OF 24-HOUR DIETARY RECALL ACCORDING TO GENDER OF RESPONDENTS

	Serving Size	
Gender	Less Than 6 Servings	6 - 11 Servings
Male (N=83)		
Frequency	24	59
Expected	32.39	50.61
Percent	14.63	35.98
Female (N=81)		
Frequency	40	41
Expected	31.61	49.39
Percent	24.39	25.00
Total	64	41
	39.02(%)	60.98(%)

*Significant association at p = 0.007

TABLE 63

CHI-SQUARE ANALYSIS ON CONSUMPTION OF MILK, YOGURT, AND CHEESE GROUP OF 24-HOUR DIETARY RECALL ACCORDING TO PLACE OF RESIDENCE OF RESPONDENTS

	Serving Size		
Place of Residence	Less Than 2 Servings	2 - 3 Servings	More Than 3 Servings
Apartment (N=125)			
Frequency	109	16	0
Expected	105.95	18.293	0.7622
Percent	66.46	9.76	0.00
House (N=22)			
Frequency	20	2	0
Expected	18.646	3.2195	0.1341
Percent	12.20	1.22	0.00
Residence Hall (N=17)			
Frequency	10	6	1
Expected	14.409	2.4878	0.1037
Percent	6.10	3.66	0.61
Total	139	24	1
	84.76(%)	14.63(%)	0.61(%)

*Significant association at p = 0.003

VITA

Pai-ching Kuo

Candidate for the Degree of

Master of Science

Thesis: FOOD HABITS, HEALTH KNOWLEDGE, AND DIETARY CHANGES AMONG TAIWANESE STUDENTS IN OKLAHOMA

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OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS REVIEW

Date: 08-25-95 **IRB#:** HE-96-007

Proposal Title: FOOD HABITS, HEALTH KNOWLEDGE AND DIETARY CHANGES OF TAIWANESE STUDENTS IN OKLAHOMA

Principal Investigator(s): Lea L. Ebro, Pai-ching Kuo

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

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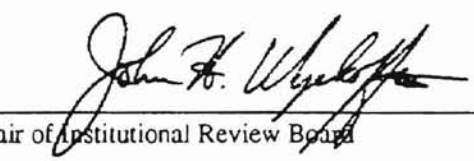
APPROVAL STATUS PERIOD VALID FOR ONE CALENDAR YEAR AFTER WHICH A CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD APPROVAL.
ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR APPROVAL.

Comments, Modifications/Conditions for Approval or Reasons for Deferral or Disapproval are as follows:

Signature:  Date: August 30, 1995

Chair of Institutional Review Board