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Title: Nutrition Screening for Chinese Elderly


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Nutrition and health-related risk factors could be identified through the

implementation of the nutrition preventive strategies, such as nutrition screening,

for the Chinese elderly population who are at high risk of malnutrition. Efficacious

culturally sensitive nutrition assessment tools and nutrition screening tools hold the

most essential value to assess the nutritional health status among the Chinese

elderly. A standardized nutrition screening tool, the DETERMINE Checklist, has

been used to determine the nutritional health risk status among the elderly but not

the Chinese elderly. Focus group research developed cultural appropriate dietary

assessment tools, the food inventory list and Chinese food photos, to evaluate the

adequacy of food consumption. A case study used the Nutrition and Health Related

Questionnaire to evaluate the efficacy of the standardized DETERMINE Checklist.

The Nutrition and Health Related Questionnaire included a dietary assessment

method, the 24-hour dietary recall, and the modified DETERMINE Checklist was

developed from the integrated questions of the standardized DETERMINE

Checklist and Level I Screen. The efficacy of the standardized checklist, the

sensitivity and specificity, among fifty-eight Chinese elderly age 70 or older, was evaluated through the comparison of the adequacy of food consumption and the identification of the nutritional health risk status. Results showed that the majority (95%) of the Chinese elderly participants had inadequate food consumption as measured by the U.S. Food Guide Pyramid. The standardized DETERMINE Checklist was not sensitive (40%-60%) or specific (63.6%-46.1%) in evaluating the nutritional health risk status among this population. The conclusion from this study was the modified DETERMINE Checklist designed for this study included questions with a single perspective in assessing the inadequacy of food consumption and the physical inability, to identify the level of severity on the nutritional health risk status better than the standardized DETERMINE Checklist. The research prototype model provided a base assessment process of the nutritional health risk status for the minority Chinese elderly. Complex interactions between acculturation, language competency, accessibility of cultural food, and socioeconomic factors related to the nutritional health risk status are needed for further qualitative research investigations.

Nutrition Screening for Chinese Elderly

by

WenYen D. Juan

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

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WenYen D. Juan, Author

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## INTRODUCTION

The total elderly population in the United States, has increased from 3 million in 1900 to 34 million in 1996, and will be an estimated 70 million in 2030. The minority elderly have increased in proportion (from 13% in 1990 to 25% in 2030) to the total elderly population in the 20<sup>th</sup> and 21<sup>st</sup> centuries (1, 2). Among the minority elderly, Asian Americans have been projected to grow more (643%) than any other minority elderly population (570% for Hispanics, 294% for American Indians, and 159% for African Americans) (2). The elderly and the minority elderly populations have been identified to be at nutritional health risk as a result of the aging process and/or language barriers (3, 4). The Committee of the Food and Nutrition Board has suggested a nutrition preventive strategy, such as nutrition screening, for the populations who are at nutritional risk (5). Therefore, nutrition screening could benefit the elderly, including the minority elderly, by implementing initial nutrition interventions to reduce nutritional health risks as reported by several authors (6-10). However, no study has been done to evaluate the efficacy of nutrition screening tools for the Asian American elderly (11). Studies need to address the complex interactions among socioeconomic status and health risk factors in minority elderly populations (12).

The elderly, including the minority elderly, have been the fastest growing population in the 20th century and this population growth trend will extend to the 21st century. Between 1960 and 1990, the percentage of elderly in the total U.S. population grew by 39%. Within that portion, persons over 64 years of age grew by 89%, and persons over 84 years of age grew by 232% (13). One of the fastest growing segments reported in 1997 of the total population was age 85 and older, who were born before 1920 (1). Due to the increasing immigration of the minority populations to the United States, the minority elderly population has been projected to grow 500 times faster than Whites from 1990 to 2050 (14). According to the U.S. Bureau of the Census population projection in 1996, considering births, deaths, internal migration, and international migration, the fastest growing population among minorities was the Asian population (15). By the year 2020, elderly Asians will account for 4% of the elderly American population according to the 1993 U.S. Census Asian population projection (16). This trend is expected to continue to the year 2050 (15, 16). The increasing numbers and proportion of the elderly, as well as the minority elderly population in the United States, will have a great impact on every aspect of our society, especially the health care system (17).

The definitions of elderly and minority vary under different circumstances and usually determine the eligibility of benefits or services in the United States. The terms, elderly and minority, used throughout the study are defined as:

Elderly: The people or population who are at the age of 60 or older

according to the qualification of the Senior Meal Program as well as the

benefits of Medicare and Social Security at the age of 60 (18, 19).

Minority: Minority is defined as a group of people whose physical or

cultural characteristics are often singled out from the others in the society

(20). The minority populations include African Americans, American

Indians and Alaska Natives, Hispanics, and Asians and Pacific Islanders

according to the definitions provided from sociologists and government

officials (20-22).

The increased proportion of minority elderly has increased the needs for

health care service delivery in providing primary care (preventive care) instead of

secondary care (physicians' care) (23). The elderly are the largest users of health

care services as a result of the increased incidences of chronic illnesses related to

the aging process. The majority of health care cost and social dependency of the

elderly has been related to the increased incidences of chronic illness, such as heart

disease and hypertension (17). Chronic diseases are uncommon at younger ages,

but the incidences have dramatically increased from middle age (age 45 to age 64)

to old age (age 65 or older) (23). Many changes related to the aging process may

lead to chronic illnesses, such as physiological functions, nutritional status, food

consumption, and food choices. Examples of those changes are dental problems,

loss of muscle mass, lower food intake, and skipping meals that may be associated

with either physical or financial problems (3). As a result of those changes, the elderly have become the largest users of health care services, including physician visits, hospital stays, and prescription drugs (3).

Nutrition-related risk factors have been associated with most of the chronic conditions among the elderly and the minority elderly populations (17). At least 40% of older people had chronic illnesses that were related to the inadequacy of nutrition or food consumption, such as heart disease, hypertension, or arthritis, which may require limiting dietary fat, limiting sodium, and/or weight control as part of their dietary treatment (24, 25). Obesity has been one of the major risk factors associated with many chronic illnesses and a problem for almost all minority elderly. For example, obesity was reported as the major risk factor associated with the high incidence of diabetes among American Indians, Latinos, and African Americans (17).

Two health care recommendations to reduce chronic diseases for all people have been the focus for the Committee of the Food and Nutrition Board of the National Research Council through the *Diet and Health* (5). Recommendation one: public health or population-based approach was used to aim at the general population. Recommendation two: the high-risk or individual-based approach used to target individuals with defined health risk profiles. The Committee identified major chronic diseases, including cardiovascular disease and cancers, which burden the general population. Consequently, the most benefit will be achieved by a public-health prevention strategy. Therefore, a nutrition-related preventive strategy

could reduce nutritional risk factors and chronic disease risks in the general population and in the populations who are at the most nutritional risks according to the Committee of the Food and Nutrition Board (5).

The populations who are at nutritional risks have been identified as the elderly and the minority elderly populations, especially the Asian American elderly (4, 26, 27). Elderly people have been identified as at nutritional risk because a significant increased prevalence of malnutrition has been found in this population as well as an increased likelihood of prescription drug usage, which may cause nutritional deficiency as a person ages (26, 27). The minority elderly, such as Asian Americans, have been denied health care partially because of language barriers and, therefore, could be at greater nutritional risks (4). In addition, the Asian American minority population, for example, the Chinese and Japanese in Oregon, have the most favorable health profile, such as lower body weight and total blood cholesterol level, than any other minority groups, yet cancers and heart diseases are still the first two major causes of death (28). More studies need to investigate the risk factors affecting the nutritional health status among Asian Americans and the Asian American elderly population (29).

Nutrition preventive strategies, such as nutrition intervention through nutrition screening, may have the greatest benefit for identifying the nutritional health status of elderly and minority elderly in the future (30). One of the most effective nutrition preventive strategies has been the nutrition screening process suggested in the study reviewed and reported by Reuben et al. (7). They speculated

that the benefits of the results from nutrition screenings could provide nutritional

risk information for further investigation by health professionals (7). The term

nutrition screening will be used throughout the study and is defined as:

> Nutrition screening is the process used to determine environmental and
>
> sociodemographic risk factors known to be associated with nutrition (8).

The results of a nutrition screening process using various tools can identify

nutritional risks of malnutrition status that may be associated with many chronic

illnesses (7). Therefore, nutritional screening for risk factors holds the most

promising value for identifying individuals at nutritional risk and can provide

opportunities for implementation of preventive measures or nutrition intervention

before clinical nutritional problems arise (30). Over 85% of older adults who suffer

from chronic diseases have benefited from nutrition intervention processes in

reducing health risks by routine visits of primary physicians as reported by Woolf et

al. of the U.S. Preventive Health Services Task Force (6).

There are many nutrition assessment methods, such as anthropometric,

biochemical, clinical, and dietary, used by health professionals which have been

developed over the years. The advantages of identifying health status and the

disadvantages of the cost of the procedure for each have been reviewed and

discussed by Lee and Nieman in 1993 (31). The biochemical tests examine the

biochemical indicators of nutritional status in the blood (e.g., hemoglobin as an

indicator of iron status), and the clinical tests diagnose the clinical symptoms of

nutritional status through physical examinations (e.g., muscle wasting indicated

protein-calorie malnutrition) (31). Both the biochemical and clinical tests have

been the most effective nutrition screening tools. However, they are also costly for

the people without health insurance coverage, such as the minority populations

(32). Twenty-nine percent of minority adults did not have health insurance

coverage, and 55% of Chinese Americans reported health care costs as a major

economic problem for them (29).

Nutrition screening tools, such as the standardized DETERMINE Checklist

and Level One (Level I) Screen, have been used by health care professionals to

promote nutrition screening processes and better nutrition care for the elderly (30,

Appendix 1). These screening tools from the Nutrition Screening Initiative were a

five-year multifaceted effort initiated in 1990 by three primary health care

organizations: American Academy of Family Physicians, The American Dietetic

Association, and National Council on Aging, Inc. (30). The standardized

DETERMINE Checklist has been a public awareness tool that indicates different

aspects of nutritional health risk factors among the elderly. This acronym stands for

disease conditions, eating poorly, tooth loss, economic hardship, reduced social

contact, multiple medications, involuntary weight loss or weight gain, needs

assistance in self care, and elderly over age 80. The checklist was designed to be

either self-administered or conducted by anyone interacting with the elderly, such

as family members, friends, neighbors, or social workers, and recognizing the

elderly who may be at an increased risk for nutritional problems (8). The

DETERMINE Checklist has been used to quickly identify individuals who may have existing or potential nutritional health risks and who may require nutrition counseling, social services, health services, or medical and nutrition intervention (33). The Level I Screen was designed to be used by health care professionals and to provide individuals with further detailed nutrition-related risk factors, such as weight changes, eating habits, economic situations, and functional status (33). Many people, especially the elderly population, become aware of their health status and seek professional help when they have been identified as at risk, thus reducing the risks of nutrition-related health problems in the future (34). Therefore, a short and effective nutritional screening checklist, which can either be self-administered or interviewer-administered by health professionals, may be a consideration for the populations who have less health care access, such as the minority populations (22).

Dietary assessment has been one of the nutrition screening tools which is the most widely used in a nutrition screening process to identify nutritional health risk factors by nutrition professionals (35). Several dietary assessment studies have been reported by researchers studying health status related to the food consumption among Asian Americans (36-40) and Asian American Elderly (41-42). However, the accuracy of evaluating food consumption data from dietary assessment among elderly has been debated, including the difficulty in recalling the food items or the amount of foods that were consumed during the day prior to the assessment (43).

Efficacy has been an essential factor of nutrition screening tools (44). The efficacious nutrition screening tools can identify nutritional health risk status

accurately among one population. The evaluation of the sensitivity and specificity of nutritional screening tools are generally the gold standards to determine the efficacy of the screening tests (44). A sensitive nutrition screening tool will identify people who are at malnutrition status correctly, and a specific nutrition screening tool will identify people who are at well nutrition status correctly (3). A study done by Zylstra (45) used the nutrition screening tools from the Nutrition Screening Initiative to identify nutritional health risk status among the Asian American elderly population. However, there has been no study evaluating the sensitivity and specificity of the nutrition screening tools from the Nutrition Screening Initiative among Asian American elderly (11).

Many research problems arose during the study of Asian Americans, especially among the Asian American elderly population as reported by the U.S. Department of Health and Human Services (17). Problems included insufficient conclusions from the samples and the use of African Americans to represent all the non-White populations. These problems indicate that many studies need to be done using only one Asian population, especially the Asian American elderly, as suggested by Gelfand (20).

The research objective for this case study was to investigate the nutritional health risk status of the Chinese elderly identified through an adequate nutrition screening tool, the modified DETERMINE Checklist. Case study was used to study a specific cultural context of population, such as the Chinese elderly population (167). The elderly population included in this study were the elderly

individuals who identified themselves as "Chinese" or "Chinese Americans". The research question of this study was: can standardized nutrition screening tools from the Nutrition Screening Initiative be used to identify the nutritional health risk status of the Chinese elderly? The purposes of the study were: (1) to evaluate nutritional health status among Chinese elderly using the integrated DETERMINE Checklist and the Level I Screen from the Nutrition Screening Initiatives; (2) to determine the adequacy of food intake through 24-hour recall of food consumption among Chinese elderly; and (3) to identify sensitivity and specificity of the screening tool, the standardized DETERMINE Checklist, among Chinese elderly.

This research study consisted of two parts: (1) the development of nutrition assessment tools including a focus group interview and a pilot study; and (2) nutrition and health status interviews. In the development of the nutrition assessment tools part, the focus group interview was to generate culturally sensitive visual aids, the food inventory list, and quantitative Chinese food photos, which could be used to assess the adequacy of food consumption among the Chinese elderly in the following planned study. The pilot study was to evaluate the nutrition and health status interviews, and the interview process and readability of the Nutrition and Health Related Questionnaire, which were used in the nutrition and health status interviews. In the nutrition and health status interviews, the adequacy of food consumption and the efficacy of the standardized DETERMINE Checklist were examined. The adequacy of food consumption was compared to the U.S. Food Guide Pyramid determined by Food Variety Score (FVS), which was the sum

of the assigned scores for each food group. The efficacy (the sensitivity and specificity) of the standardized DETERMINE Checklist in identifying the nutritional health risk status of Chinese elderly was evaluated by comparing it to the adequacy of food consumption. The research results would be the most beneficial in identifying the risk factors which might be associated with nutritional health risk status during a nutrition screening process for the Chinese elderly individuals. The nutrition-related risk factors included demographic characteristics, acculturation, language competency, attitude and awareness of nutrition and health, accessibility to Asian foods, receiving government benefits, health insurance coverage, and health status among Chinese elderly.

The two expected outcomes in identifying nutritional health risk among Chinese elderly for this research are: (1) Chinese elderly who were at nutritional risk living in the Northwest metropolitan and suburban areas in a thirty mile radius from the cities of Portland, Beaverton, Salem, Corvallis, and Eugene in Oregon could be identified; and (2) a standardized nutrition tool, the DETERMINE Checklist, could be used to identify the nutritional risk status efficaciously among Chinese elderly. A study done by Zylstra in 1995 (45) using the standardized DETERMINE Checklist to evaluate the nutritional status among Asian American elderly in Washington State has identified nutrition-related risk behaviors and provided base information for effective community nutrition services among populations at nutritional risk. Zylstra suggested further investigations examining the relationships between nutrition-related risk behaviors and demographic

characteristics among minority elderly. However, there has not been a study

conducted to evaluate the nutritional health status among those populations in

Oregon.

Implementation of the research results from this study will allow the health

professional to evaluate the adequacy of food consumption and determine the

nutritional health risk status among the Chinese elderly population, and further

apply this process for other elderly populations who may be at nutritional health

risk. The assessment of the food consumption using the culturally sensitive food

inventory list and quantitative Chinese food photos can assist nutritionists to

identify the adequacy of food intake among the Chinese elderly population. The

determination of nutritional health risk factors and status can help the Chinese

elderly individuals identify their nutritional health risks quickly and efficaciously,

and then, to further seek the assistance of specialty health professionals. Most of

all, the development process of the nutrition assessment tools and the evaluation

method of nutrition screening tools can be applied in other elderly population who

may be at nutritional health risks.

SELECTED LITERATURE REVIEW

Nutrition assessments including nutrition screening have been valuable in identifying the nutrition-related risk factors among populations, especially in the populations who have significant prevalence of malnutrition, such as the elderly and minority elderly (4, 35). The growth of elderly and Asian American elderly populations has been and is projected to be an increasing trend until the year 2050 (1, 15). Needs for culturally specific health research instruments have increased due to the limited research data or inadequate research conclusions from the samples of the health status among the minority elderly, especially the Asian American elderly (12, 50, 71).

## Population Trends and Projections

The most significant demographic trend of the population in the United States has been the rapid growth of the elderly (1). The elderly in the U.S. have also become racially diverse and are projected to become more diverse in the 21$^{st}$ century (14). Significantly increased migration and birth rates result in the growing of minority elderly, and Asian American elderly have been projected to be the fastest growth among minority elderly populations to the year 2050 (57, 58). Characteristics related to the elderly population trend have been studied by government agencies and researchers (1, 3, 7).

The rapid growth of the elderly population in numbers and proportions has been a consistent trend in the 20<sup>th</sup> century. In 1900, less than 4% of Americans were age 65 or older. According to a late 1987 U.S. Bureau of Census report, 12.5% (30 million) of Americans were age 65 or older (46). Since 1990, the number of Americans age 65 or older increased by 8% every year until 1996 (1). In 1997, the U.S. Bureau of the Census reported 14% (34 million) of Americans were age 65 or older (1).

The projection of the elderly population by the U.S. Census Bureau predicts that the growth of the elderly population would be more than double between the years 1996 and 2050 (2). In 1996, the elderly population in the United States represented 12% of the total population. People age 65 or older will represent at least 13% of the total population in the year 2000. By the year 2030, there will be more than 21% (65 million) of the total population over the age of 65 in the United States. In the year 2050, 25% of the population (80 million) will be the people age 65 or older, based on the projection by the U.S. Bureau of Census.

The age of the "elderly" is identified at various levels depending upon civil act or benefits from government agencies. The Age Discrimination Act of 1975 determines that people older than age 40 cannot be discriminated against from hiring, promotion, discharge, compensation, terms, conditions, or privileges of employment on the basis of being "old" (18). Elderly people, age 60 or older, can participate in Senior Nutrition Programs, according to the Older American Act of 1965, as well as receive Social Security benefits (18, 19). The U.S. Bureau of

Census defines people who are "age 65 or older" as the "elderly population", which has been viewed as the benchmark of elderly populations, and the traditional age of retirement (3, 13, 46).

People age 85 or older, the oldest-olds, have had the highest growth rate among the elderly between the years of 1900 and 1996, and the growth in this group has been projected to continue to be the highest rate until the year 2050 (1, 2). Between the years 1900 and 1996, the young-olds (between the ages of 65 and 74), the old-olds (the age 75 to 84), and the oldest-olds (the age of 85 or above) populations grew 8, 16, and 31 times larger, respectively (1). In 1995, the highest proportion among the elderly population of the total population was the young-olds (7.1%). It was followed by the old-olds (4.2%) and the oldest-olds (1.4%) (2). By the year 2050, the oldest-olds will be tripled in portion of the total population (to 4.6 %) while the young-olds will increase 1.9% (to 8.8%), and the old-olds will increase 2.4% (to 6.6%) (2).

Increased birth rate, decreased infant mortality, and longevity have been identified as the reasons for the increasing elderly population (1, 20, 47). Increased birth rates before 1920 and between 1946 and 1964 have resulted in increased numbers of elderly populations (47). The large number of people who were born before 1920 represents increasing numbers of people in their 70s and 80s. The aging of the Baby Boomer generation, which was born between 1946 and 1964, will lead to the rising numbers of elderly populations starting at the year 2010. In addition to the increased birth rates, infant mortality has been lower in Asians (24,

25). For example, the infant mortality rates according to the mothers' races were 17.1 for Blacks, 12.6 for American Indians, 7.4 for Whites, 7.6 for Hispanics, and 6.6 for Asians in 1995. Longevity has also contributed to the rising number of elderly. For example, when the United States was founded in 1776, life expectancy was 35 years (20). It reached 47 years in 1900, 68 years in 1950, and 76 years in 1991. In 1996, a person age 65 could expect to live 17 years more (1).

Women generally survive to an older age and outnumber men because women have an average longer life expectancy than men, according to the Administration on Aging of the Department of Health and Human Services (2, 17). Life expectancy was 79 years for women and 72 years for men in 1991, and it became 84 years and 73 years for women and men respectively in 1996 (1). As a result, there were 45% more elderly women than elderly men in 1995 (2). The ratio of men to women was 1 to 1.2 among the young-olds (age 65 to 74), compared to 1 to 1.6 between the old-olds (age 75-84) and 1 to 2.6 among the oldest-olds (age 85 or older) in 1995 (2).

The mortality rate from the leading cause of death, heart disease, has been reduced through preventive strategies, which were also found associated with the rising number of the elderly population (24, 25). Since 1970, mortality rates from heart disease have decreased by 40% among the age 65 or older population (24). This reduced mortality has been achieved through the improvement of chronic illness conditions and the emphasis on preventive strategies as reported by the U.S. Department of Health and Human Services (24, 25). The preventive strategies

included appropriate diet and exercise, rising nutrition awareness, and better life-style patterns, which had also resulted in increasing life expectancy among all ages (25).

The total population in the United States includes Whites, Blacks, Hispanics, Asians, and American Indians with the fastest growth rate reported in Asians. This population has become diverse and is projected to be more diverse until the year 2050 (57, 58). The Whites have been the highest proportion of the total population but have been projected to be the slowest growing population until the year 2050 (15). In 1990, the total population in the U.S. consisted of 75.6% Whites; 12.3% Blacks; 9.0 % Hispanics; 3.0% Asians; and 0.8% American Indians (57). The total population growth between 1990 and 1996 reflects that Whites have increased by 3%, Blacks by 8.8%, Hispanics by 23%, Asians by 28.5%, and American Indians by 9.5% (16). By the year 2050, the total population will be made up of 52% of Whites; 16% of Blacks; 23% of Hispanics; 10% of Asians; and 1% of American Indians (58).

Many professionals have identified the "minority population" differently. In 1945, Louis Wirth, a sociologist, proposed that a minority population was a group of people who were singled out from the others in the society because of their physical or cultural characteristics (21). In 1958, Wagley and Harris defined the minority population as a sub-unit of the society with distinct physical and cultural characteristics, and as those who have strong ties among population group members (48). In the mid-nineteenth century, the tremendous immigration of ethnic groups

making up what is known as "Americans" included Irish, Italians, Scandinavians, Slavs, Anglo Saxons, and other White origins (17). The Office of Management and Budget of the Census Bureau has defined and described the subgroups for each race from the total populations, which were the definitions used by all federal agencies (15). The minority often included Blacks, Hispanics, Asians, and American Indians. These subgroups include:

- White: a person having origins in any of the original peoples of Europe, North Africa, or the Middle East. The term "Whites" will be used to represent all of the above races.

- Black: a person having origins in any of the Black racial groups of Africa. The term "Blacks" will be used to refer to all black racial groups.

- Hispanic: a person of Mexican, Puerto Rican, Cuban, Central or South American, and other Spanish cultures or origins, regardless of race. All of those are also referred to "Hispanics" or "Latinos".

- Asian and Pacific Islander: a person having origins in any of the original people of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands. This area includes, for example, China, India, Japan, Korea, the Philippine Islands, and Samoa. The term" Asians" refers to the race groups of Asian and Pacific Islander.

- American Indian, Eskimo, and Aleut: a person having origins in any of the original people of North America, who maintain cultural identifications

through tribal affiliation or community recognition. The term "American Indians" refers to the race group of American Indian, Eskimo, and Aleut.

Ethnically diverse elderly populations in the United States have been projected to be a significant population trend in the 21$^{st}$ century (14, 15). According to the U.S. Bureau of Census in 1996, 15% of the elderly were non-White, including 7.9% Blacks, 4.7% Hispanics, 1.9% Asian Americans, and less than 1% American Indians (1). The White elderly population has been projected to increase by 91% between 1990 and 2050, compared to 328% for the combined non-White elderly population (20). According to the 1996 population projections by the U.S. Bureau of Census, by the year 2050, the total elderly population will be 20.4% including White elderly, 4.7%; Black elderly, 2.8%; Hispanic elderly, 2.9%; Asian elderly, 3.1%; and American Indians elderly, 2.6% (57, 58). In year 2050, 20% of the total elderly population will most likely be non-Whites, according to the population projections by the U.S. Census Bureau in 1997 (13).

Asian American elderly have been ranked at the highest projected growth rate among minority elderly. According to the 1996 U.S. Census of Bureau population projections, between 1990 and 2050, the increases are projected to be 9.3% Asian American elderly; 9% Hispanic elderly; 7% American Indian elderly; and 5.4% Black elderly (57, 58). In the year 2020, Asian American elderly are projected to be 4% to 8% of the total elderly population, according to the U.S. Census Asian population projections in 1996 (12, 16).

The projected differences in growth of elderly non-White populations,

including both genders, have also been related to birth rate, mortality, and life

expectancy. High birth rates among Black and Asian populations resulted in

greater proportions of children and young people among those groups (17). Lower

mortality rates play a role for increasing numbers of both Asians and Hispanics

(17). Asians have an average longer life expectancy in years compared to other

non-White races for both men and women in 1995. Life expectancies in 1995 for

both men and women in all populations are; (1) Whites: 73.6 for men, 80.1 for

women; (2) Blacks: 64.8 for men, 74.5 for women; (3) Hispanics: 74.9 for men,

82.2 for women; (4) Asians: 79.3 for men, 84.9 for women; (5) American Indians:

72.0 for men, 80.4 for women. This trend of the average life expectancies has been

projected to increase among Asians for both men and women in 2020 compared to

1995 and seem to be longer for women than have for men (16). Life expectancies

in 2020 for both men and women in all populations are; (1) Whites: 77.1 for men,

82.6 for women; (2) Blacks: 66.5 for men, 76.5 for women; (3) Hispanics: 78.3 for

men, 85.4 for women; (4) Asians: 81.1 for men, 86.2 for women; (5) American

Indians: 75.1 for men, 82.8 for women.


## Characteristics Related to Population Trends

Studies have found characteristics related to the population trends of the

increasing number and proportion of the elderly population and Asian American

elderly population. Those characteristics including health status, physical conditions, gender differences, economic situations, and health care expenditure, as well as eating behaviors and attitudes toward nutrition are associated with the population trend. The following section will review these characteristics related to the total elderly population or Asian American elderly population.

## Total Elderly Population

The health status of the total elderly population has been identified by incidences of chronic illnesses and leading causes of death. The 1997 Census data showed that at least four out of every five persons age 65 or older had one or more chronic illnesses and it was found related to the leading causes of death which were identified as heart disease, cancer, and stroke (1, 3, 28). Those leading causes of death among the elderly population increased as age increased, according to the 1994 and 1995 National Center for Health and Statistics (24, 25).

Functional limitations, such as activities of daily living (ADLs), such as bathing and dressing, or instrumental activities of daily living (IADLs), such as shopping, or preparing foods, among the elderly can increase dependency on the society or the health care system, and have been projected to increase in the year 2040 (7, 20). In 1997, the Administration on Aging published data with more than half of the elderly population (53.9%) reporting at least one disability limiting activities of daily living and instrumental activities of daily living (1). The ADLs

limitations among the elderly are projected to increase by over 300% from 1990 to the year 2040 (7). The ADLs include bathing, dressing, eating, and getting around the house. The IADLs include preparing meals, shopping, managing money, using the telephone, doing housework, and taking medication (66, 67).

Chronic illnesses causing restricted usual activities, such as ADLs, increased with age among the elderly and resulted in long-term care stays (3). In 1997, the Administration on Aging published data where elderly had an average of 35 days of usual activity restrictions because of illness or injury (1). Older women had an average of longer number of days with restricted daily activity because of illness or injury than had older men (37 vs. 31 days) (1). Eight percent of people age 65 to 69 needing assistance to perform ADLs increased to 42.3% of the people age 85 or older (1). As a result, the elderly living in nursing homes increased from 5% of young-olds (age 65 to 74 year) to 22% of oldest-olds (people age 85 or older), according to the Administration on Aging in 1997 (2).

Gender differences of health risks and access to health care systems are also seen among the elderly. Elderly women are at a greater health risk and have less health care access than elderly men when economic barriers occur (3). Men tend to develop fatal diseases, whereas women are more likely to have chronic illnesses, which may continue for many years of life (17). Of people age 75 or older, incidences of chronic illnesses in women are primarily due to the lack of access to health care systems (3). Women have more restrictions to medical care when they lose the economic supports from their spouses (17). Restrictions of the access to

medical care would directly affect men more than women when medical interventions could affect the length of life among men (17).

A significant proportion of elderly people live below the poverty level, and this status increases with age and is related to living arrangements (1). In addition, the elderly are less likely to receive public assistance than are younger people. In 1997, 11% of young-olds, and 16% of old-olds and oldest-olds were found to have incomes below the poverty level (1). The 1996 poverty thresholds for elderly age 65 or older were $9,491 per year for a two-person household (59). Elderly women had a higher poverty rate than elderly men, 13.6% and 6.8%, respectively, in 1996 (13). The median income per year of person age 65 or older was $16,684 for men and $9,626 for women in 1995 (1). Approximately 16% and 40% of the elderly who were the heads of households had incomes less than $15,000 and $10,000 per year in 1996, respectively, and the poverty level was $10,259 per year for a two-person household in 1995 (1). In 1996, 92% of the elderly reported their major income source was from Social Security. In addition, the elderly who live alone or with non-relatives were more likely to be poor than were older persons living with families (20.8% vs. 6%) (17). Older persons were less likely than younger people to receive public assistance income (8% vs. 9%) and food stamps (6% vs. 10%) or to have Medicaid coverage (12% vs. 14%). Taking real estate assets into account, 16% of the net worth of older persons who own houses were below $10,000 in 1993 (1).

Health care expenditures are higher for the elderly population than for the younger population (1, 59). The age 65 or older population represented 12.7% of the total United States population but accounted for 25% of total health care expenditures in 1995 (59). Hospital expenses accounted for the largest share (42%) of health expenditures for older persons, followed by physicians (21%) and nursing home care (20%) (1). The elderly are more likely to be hospitalized and stay longer in the hospital when they get sick than younger populations (7 vs. 4 days) (3). The elderly accounted for 38% of total hospital stays in 1997 (2). Only about 25% of each older person's health care expenses came from direct payment (out-of-pocket), and most were from indirect payment (government benefit programs), including Medicare and Medicaid (2). Government benefits covered about 63% of the health care expenditures for the elderly compared to 26% for people under age 65, according to data published by Administration on Aging in 1997 (1).

Elderly people were found eating healthier and having healthier eating attitudes than the younger population. Results from the Third National Health and Nutrition Examination Survey, Phase 1, 1988-1991, showed that 2,566 elderly participants age 60 or older consumed lower total energy from dietary fat (32%) and total energy from saturated fat (11%) compared to younger participants (33% and 12%) (60). The 1994 Continuing Survey of Food Intakes by Individuals (CSFII), conducted by the U.S. Department of Agriculture (62), found that among 4,952 surveyed individuals, a higher average percentage of elderly people age 60 or older consumed 30% or less total energy from fat (36%) and 10% or less total energy

from saturated fat (43%) than the younger population (31% and 34%). A lower percentage of the elderly age 60 or older consumed less than one serving of fruits (9%) and vegetables (9%) than the younger population (12% and 12%) in the 1994 CSFII study (62). Thus, a higher percentage of the elderly were found eating more fruits and vegetables than the younger population (49, 61). In the results of a current 1997 Nutrition Trend Study, conducted by The American Dietetic Association, a higher percentage of elderly people than the younger population (55% vs. 28%) reported that they had done all they could to eat well (63). More elderly people reported thinking about the importance of nutrition and concerns of weight control than younger people among 6,983 individuals, according to results from the 1994 -1996 CSFII study (49).

## Asian American Elderly Population

The health status of Asian Americans, Asian American elderly, and subgroups of Asian Americans was found to be controversial between earlier studies done by government agencies and current studies done by researchers. Results from one of the earlier and most comprehensive studies done by the Department of Health and Human Services found that Japanese Americans had a 2.5 times higher incidence of stomach and esophageal cancers than the non-minority population (69). Increased alcohol consumption and smoking might have caused the 17% increased incidence of multiple myeloma among Chinese

Americans (69). The mortality from stroke was found to be similar among

Japanese Americans and Whites (69). According to U.S. Census data, the mortality

rates of heart disease (46% below the rate for total population) and lung cancer

(53% below the rate for total population), the leading causes of death, were found

to be lower in Asian Americans than the total population (19%) (16). However,

two later studies identified Asian American elderly with a higher health risk than

the total population. Results from the study by McBride et al. in 1996 showed that

the Asian American elderly had higher risks of diabetes and stomach and

esophageal cancers than the total elderly population in the US (64). One of the

most current studies, by Ren and Chang in 1998, evaluated the health status of 219

Chinese elderly and found the Chinese young-olds had worse physical functions

and general health status than their total elderly cohorts in the U.S. due to emotional

problems and mental health (50). Overall, the U.S. Census data reflected the health

status of Asian Americans as not at increased risk (16, 69). However, in 1972, Li et

al. suggested general perceptions of Asians having good health could seriously

mask the health problems among this population (65).

The poverty level differs from year to year, depending upon the number of

people per household. The poverty level has increased each year, yet the percentage

of Asian American elderly living below the poverty level has fluctuated compared

to the stable percentages of the total elderly population. A comparison of the

poverty levels in selected years between the Asian Americans or Asian American

elderly and total population or total elderly population are as follows:

- 1990: poverty level $7,905 with 11.9% Asian Americans living below the poverty, compared to 10.3% of total population living below the poverty (67).

- 1993: poverty level $8740 with 10.3% Asian Americans living below the poverty (68).

- 1995: poverty level $9,219 with 14.3% Asian American elderly living below the poverty, and 10.5% total elderly population living below the poverty (59).

- 1996: poverty level $9,491 with 9.7% Asian American elderly living below the poverty, and 10.8% total elderly population living below the poverty (59).

The Asian Americans and Asian American elderly living in the United States were found practicing traditional Asian dietary habits, such as eating rice, fruits, and vegetables, and consuming lower than the recommended amounts of minerals and vitamins (39, 69, 114). Rice is the primary source of calories from the diet for Asian Americans living in the U.S., and more than half of Asian Americans reported consuming fruits and vegetables (53%) as the traditional dietary habits in 1985 (69). However, nutrient consumption was inadequate, such as calcium and vitamin A among Asian American elderly living in the US, according to Kim et al. in 1993 (114). About half (49%) of 309 Asian American elderly, including

Chinese, Korean, and Japanese, consumed less than 67% of the Recommended

Daily Allowances (RDAs) for calcium, and about one-third (36.5%) consumed less

than 67% of RDAs for vitamin A (114). The main calcium sources were soy

products and green leafy vegetables (69). The RDAs are the dietary

recommendations for adequate nutrients needs for all healthy populations (104).

Acculturation and adaptation of traditional Asian diets to the foods available

in the United States can affect the food consumption among Asian Americans and

Asian American elderly. Traditional diet habits and food preparation, including

eating traditional foods, such as rice and vegetables, and cooking foods in mixed

dishes, were still practiced among Asians in the United States (38). According to

Tong's study in 1991, the dietary habits among 62 Vietnamese elderly living in the

United States were similar to the traditional Vietnamese elderly dietary habits who

were not living in the United States (42). Eighty-seven percent of the elderly

prepared Vietnamese-style meals daily and reported modifying dietary habits to

cope with the acculturation of living in the United States. Seventy percent and

47%, and 94% and 65% of the Vietnamese elderly consumed rice and green

vegetables at lunch or at dinner, respectively. The increased portion of caloric

intakes was from animal proteins and fats and decreased fiber consumption (69).

Similar research results of increasing consumption of fats and decreasing

consumption of fiber affected by acculturation and adaptation among Asian

Americans were found in Yang and Read's dietary habits study among 382 Asian

American immigrants in 1996, Sun and Wu's comparison of diet habits study

between native-born and foreign-born Chinese in 1997, and Kamath et al.'s dietary habits study among 650 Asian Indian families in 1997 (36, 39, 40). Socioeconomic factors can clearly affect the dietary habits among Asian American elderly (42). Bernard et al. in 1997 (12) suggested detailed research on cultural specific complex interactions between socioeconomic and nutrition-related health risk factors among minority elderly populations.

Inadequate research results of the Asian American elderly and the majority of the research on the Asian Americans were done in the earlier years of 1980's and 1990's (5, 24). Data on the health status of Asian American elderly were limited and biased because of the inadequate data collection procedure. Either there was data lumping all heterogeneous subgroups and all ages of the Asian American population together, or there was virtually no data on the Asian American elderly (12, 17). The only comprehensive health risks study, the Secretary's Task Force on Black and Minority Health, was reported in the mid-1980's by the U.S. Department of Health and Human Service (69). A more recent and vital study on Asian Americans was conducted by the National Center for Health Statistics, collected from 50 states, in 1990 (70). Asian Americans were included in the "other" category in this study. Other national studies primarily used English-speaking Asians (15). The need for in-depth culturally specific health research, such as culture-specific study, has been addressed by many researchers because of those deficiencies in research on the Asian Americans (17, 50, 71, 72).

## Nutrition Assessment and Nutrition Intervention

The elderly, including minority elderly, in the United States, have been identified as one of the populations at nutritional risk because of the nutrition-related risk factors affecting the aging process and the health status (3, 4, 7). Many possible nutrition-related risk factors have been found, such as rapid weight loss or weight gain, poor functional status, and social isolation, which may affect the health status of the elderly population according to Reuben et al. as well as professional associations (6, 7, 8). Nutrition-related risk factors can be determined through nutrition assessment methods (7). Nutrition assessment which includes nutrition screening, has been designed as a preventive strategy to measure the level of risk factors affecting the health and diet status of individuals (8, 72).

## Nutrition-Related Risk Factors

Nutrition-related health risk factors can provide baseline information to predict poor nutritional status (74). Nutrition-related health risk factors, such as physical, economic, social, geographic location, living arrangement, and food choices, have been recognized and reviewed as being associated with the health status of the elderly (3). In 1973, Rao (51) presented a disease and social interrelation model that could influence the health status of the elderly in the aging process, including chronic disease conditions, poor nutrition status, lack of nutrition

knowledge, inadequate food consumption or food habits, reduced energy

requirement, low income, poor housing conditions, and social isolation (51).

Components of Rao's model were considered as potential nutrition-related health

risk factors occurring in the aging process.

Three major aging theories--environmental, developmental genetic, and

social theory of aging--have been reviewed and identified by Schlenker (3) and

Robinson et al. (55) to explain the reason why the aging process occurs. These

theories could provide an understanding of nutritional health risk factors which

affect the health status of elderly (3). The environmental theory of aging suggests

that the aging process results from mutations in genetic materials and the synthesis

of abnormal proteins as the result of affects from the individual's surrounding

environment (52, 53). The developmental genetic theory of aging identifies the

aging process as a continuation of development and is controlled by genes (54).

Environmental factors would affect the genetically predisposed effects, according to

Barinaga in 1991 (54). These genetic effects would only likely affect predisposition

to diseases, such as diabetes and hypercholesterolemia. The social theory of aging

identifies age as altering the role a person plays in the society (55). How well the

elderly individuals adjusted to the aging process would depend on how well the

elderly individuals accept their aging roles. If older persons were more active or

satisfied with their lives, they had better adjustments to their aging roles and self-

perception would be more positive (55). Successful aging has been a theory of

improvement of the quality of life at an advanced age and lowers the effects of risk

factors affecting the aging process among elderly populations, such as

environmental and social factors, according to Weimer in 1998 (56).


Total Elderly


Many studies have found risk factors that are related to the nutritional health

status among the total elderly population including Body Mass Index (BMI), weight

status, economic situation, diet, vitamin usage, living location and arrangement, and

food choices (75, 79, 82, 85, 87, 92). These factors can be used to predict the health

status among the elderly population.

Body Mass Index (BMI) has been a useful measurement tool to evaluate

body composition, which has been used to assess the relationship with mortality,

age, income, cardiovascular disease, and living arrangement (75). The BMI

provides a useful estimate of body fat which has been a better evaluation tool than

just height and weight measurements alone (75). This index is calculated from the

body weight in kilograms (kg) divided by height in meters (m) squared (weight (kg)

/ height ($m^2$), 1 kg=2.2 pounds, 1 m=39.3 inches) (75). Overweight is defined as a

BMI greater than 27.8 kg/$m^2$ for men and 27.3 kg/$m^2$ for women, according to the

U.S. Department of Health and Human Services (80). There is an increased risk of

mortality among the most obese people (BMI greater than 28.5 for elderly men and

greater than 28.7 for elderly women), which was evident in 3,630 individuals who

participated in the Framingham Heart Study (76). Among the individuals with higher BMI, mortality risk remained high at both 55 and 65 years of age when the baseline BMI was considered between 23.0 and 25.2 for elderly men and between 24.1 and 26.1 for elderly women (76). The risk of death was doubled for men who were overweight both at ages 55 and 65, compared to those who became overweight after age 55. Both men and women with a higher BMI at age 65 were at higher health risks compared with individuals with an average BMI (76).

Increased mortality risks of elderly individuals were found among both the elderly people with either lowest BMI (BMI <24 kg/m$^2$) or the highest BMI (BMI > 28 kg/m$^2$) and had incomes below the poverty level, according to the research results from the National Health and Nutrition Examination Survey I (NHANES I) Follow-Up Study (77). The increased risk was suggested to be related to the lack of medical services for controlling nutrition-related health risks, such as high blood pressure or hyperlipidemia, which were associated with obesity (77). In the long-term Buffalo Health Study, where 576 elderly were followed for 29 years, a positive association was found between persons with a BMI greater than 27 and the risk of cardiovascular disease among women age 65 or older, but not among men (78). The prevalence of being overweight was also reported in NHANES II and Hispanic HANES studies (79, 80). High prevalence of being overweight has also been found among elderly women regardless of race or poverty status. Overweight men and women were defined as having a BMI greater than 27.8 kg/m$^2$ and greater than 27.3 kg/m$^2$, respectively. Overweight (BMI greater than 27 kg/m$^2$) and low body mass

index (BMI below 22 kg/m$^2$) were both associated with increased mortality, hospitalization, and decreased ability to cope with living alone (81).

Weight status, such as rapid and involuntary weight loss, among the elderly was found to be a sign of physical or mental deterioration, as identified by Fischer and Johnson in 1990 (82). When energy consumption decreased, a large amount of body fat and small amount of lean body tissue could be lost among the elderly. Involuntary weight loss could be caused by many reasons, such as chronic diseases, dementia, or disability, and it would alter food intake or physical conditions. Chronic disease, such as hyperthyroidism, can cause weight loss because of an elevated metabolic rate (55). Therefore, body weight should be measured once a month, and the current weight should be compared with previous weight measurements to evaluate the health status among the elderly (82). Psychiatric causes, such as depression, were illnesses that could also cause weight loss (83). Weight loss could be prevented by appropriate nutritional support, according to Chernoff in 1991 (84).

Weight gain was found to influence the occurrence of chronic diseases, such as osteorarthritis, and could affect the functional capacity among elderly populations (85). According to the results of a study by Lynch et al., an average weight gain of 27 kg (60 pounds) between the ages of 60 and 89 among patients with osteoarthritis could affect functional capacity and the ability to remain independent among elderly populations (85).

Economic factors were related to the prevalence of overweight status, quality of diet, and mortality among the elderly, according to the NHANES I Follow-Up study and the Finnish Kuopio Ischemic Heart Disease Risk Factor study (79, 85). Lower income level was associated with higher prevalence of overweight status among women whereas the reverse was found among men (79). In the NHANES I Follow-Up Study (1971-1974), the relationship of survival rate was examined with dietary quality which was defined as "poor" if the consumption of five or more nutrients was below 67% of the Recommended Dietary Allowances (RDAs) from participants' 24-hour dietary recall data (79). The relative hazards (RH) between poor diet quality, and survival rate decreased after being adjusted according to poverty level (79). The Finnish Kuopio Ischemic Heart Disease Risk Factor Study (1984-1993) found that the relative risks between different risk factors and all-cause mortality were reduced after being adjusted by income level (85). The different risk factors included three kinds: behavioral, psychological, and social risk factors. The behavioral risk factors included alcohol, smoking, and physical activity; the psychological risk factors included depression, hopelessness, and hostility; and the social risk factors included social interactions and marital status.

Diet in relation to the health status of the elderly has been studied in the aspects of composition and consumption. In the 1977-1978 Nationwide Food Consumption Survey conducted by the U.S. Department of Agriculture, the quality of diets consumed by people age 65 or older was examined (87). A "better diet quality" was defined as a diet that provided at least 67% of the Recommended

Dietary Allowances (RDAs) for five out of the nine nutrients including vitamins A, C, $B_6$, $B_{12}$, $B_1$, $B_2$, calcium, iron, and magnesium. About 88% of men, age 65 to 84, and 81% of women, age 85 or older, had a "better diet quality" than other age groups. On the other hand, there were only 31% of men aged 65 to 84 and 21% of women aged 85 or older reporting intakes of all nine nutrients above the RDAs. One elderly nutritional status survey that was conducted among free-living elderly age 60 or older, residing in the Boston area, was reviewed by Trucker (91) in 1995. Trucker reported that 25% of elderly participants consumed less than 67% of the RDAs for energy. Sixty percent of elderly participants consumed less than 67% of RDAs for vitamin D; 50% consumed less than 67% of RDA for zinc; and 31% consumed less than 67% of RDA for calcium. However, the results of the 1995 Continuing Survey of Food Intakes by Individuals (CSFII) conducted by the U.S. Department of Agriculture showed that about 85% of women and 80% of men age 60 or older, and 75% of women and 60% of men age 60 or above did not meet RDA requirements for zinc and calcium (61). In addition, high percentages (40% and 60%) of people age 60 or older did not meet the RDA requirements for folate and vitamin B6 (61).

Multivitamin use to supplement diets was a more common practice among the elderly population in both genders than in the younger age groups (92). Some nutrients, such as calcium and zinc, which elderly acquired from their diets, were frequently reported below the RDA recommendation according to the 1995 CSFII study and Moss in 1989 (61, 92). Older women were more likely to take

supplements than older men (57% vs. 43%). Among those people who took supplements, about 57% women and 62% of men took multivitamins containing more than three kinds of nutrients (92).

Income, living arrangement, and geographic location were found to be related to food consumption or quality of diet among the elderly. A lower income level was associated with low food expenditure, poor health, and poor diet quality among the elderly (87). Living alone was a risk factor for dietary inadequacy, especially among men age 75 or older as reported by Walker and Beauchene in 1991 (88). Living alone resulted in eating too little food instead of poor quality of foods. In addition, the elderly who lived in rural areas were more likely to be associated with more functional limitations, more chronic conditions, living alone, less social contact with others, higher degrees of loneliness, and lower intakes of some nutrients (13, 88, 89, 90).

Geographic locations associated with health status, marital status, self-perceived health status, and physical conditions of the elderly population have been reported by a government agency and researchers (1, 87, 89, 90). The elderly were found to be less likely to live in metropolitan areas than younger persons (76% vs. 80%) as reported by the Administration on Aging in 1995 (1). Elderly living in rural areas and non-metropolitan areas had an average less education, poorer health conditions, and a higher prevalence of chronic illnesses and disabilities than the elderly living in urban areas (89). According to the 1990 U.S. Census Bureau, 26% of elderly lived in non-metropolitan areas, and about two-thirds of all non-

metropolitan elderly were residents of rural towns (13). Non-metropolitan elderly

people were more likely to live alone, while elderly living in urban areas were more

likely to be married (93, 94). Thirty-six percent of non-metropolitan elderly rated

their own health as fair or poor, compared to 29% of the metropolitan elderly (90).

The elderly living in rural areas were found to be associated with a 31% increased

likelihood of having at least one functional limitation; a 21% increased likelihood

of having one or more chronic conditions; and a 12% increased likelihood in

difficulties associated with performance of one or more activities of daily livings

(ADLs) and instrumental activities of daily livings (IADLs) (90).

The U.S. Census Bureau has defined the geographic locations of "rural",

"urban", and " non-metropolitan" areas, which were the areas with populations

living in small towns and rural areas outside of a large city (102). A rural area has

been defined as a territory outside places of 2,500 or more residents or areas outside

an urbanized area. An urbanized area is comprised of one or more places and the

adjacent surrounding territories that together have a minimum of 50,000 persons. A

metropolitan area is a county containing a place or urbanized area of 50,000

persons or more and a total population of 100,000 or more, including adjacent

counties that have a high degree of economic and social integration with the central

county. Non-metropolitan areas refer to counties outside a metropolitan area.

Living arrangement differences affect the social contacts in both elderly

men and women. People living alone were less likely to have social contacts than

people living with others (88). The likelihood of living alone increased with age

among both men and women (20). Elderly women living alone increased from 32% to 57% among young-olds and oldest-olds, respectively. Elderly men living alone increased from 13% to 29% for young-olds and oldest-olds, respectively. In addition, more elderly women were likely to live alone or live with non-relatives in their later lives than elderly men (17). The non-institutionalized elderly living alone were 80% of women and 20% of men in 1993 (17).

Living arrangements can affect the quality of diet and attitude towards prescribed diets among the elderly. Loneliness was significantly related to overall diet adequacy (88). The elderly who had fewer social contacts and had a greater degree of loneliness reported a lower intake of certain nutrients, such as protein, iron, riboflavin, niacin, ascorbic acid, and phosphorus (88). A person who lived with other people and had been ignored by these people, experienced more loneliness than a person who lives alone but has daily conversations with a friend (95, 96). Elderly people who were satisfied with the attention in the form of visitations or telephone calls that they received from their family members had fewer complaints about their food and made better adjustments to prescribed or therapeutic diets (96).

The western region of the United States has been projected to be one of the most popular geographic living regions for the elderly populations (1). However, the states with the greatest proportion of elderly are generally different from those with the greatest number of elderly (1). The state of California had the highest numbers of elderly, according to the Administration on Aging in 1996 (1). The

state of Oregon ranked the thirteenth highest elderly population proportionally in 1996 and had been projected to be one of the most popular states in the western region for the residence of the elderly population to the year 2025, according to the 1996 U.S. Census population projection (1,15).

Food choices, including food selection, preparation, and consumption, could affect the consumption of certain kind of nutrients (3). The food choices are influenced by three kinds of factors: psychological, physiological, and socioeconomic factors (3). Those factors are discussed as following.

The first kind of factors, the psychological factors influencing food choices, include social activity and loneliness, nutrition knowledge, and perceived health benefits. People who experience the lowest social activity or highest degree of loneliness were found to have lower intakes of protein, iron, riboflavin, niacin, ascorbic acid, and phosphorus (88). People with higher nutrition knowledge had a better quality of diet calculated by mean adequacy ratio score (a total of ratios from each nutrient intake divided by each RDA nutrient requirement) (97). According to the theory of the Health Belief Model (HBM), first suggested by Rosenstock (98) in 1960, when people were afraid of diseases, healthy behaviors were motivated. When people perceived benefits from overcoming practical obstacles, health behaviors would occur. For example, the elderly people would choose to eat low fat foods or eat a recommended number of servings of fruits and vegetables when they had perceived their ability to overcome the barriers (49, 60-62).

The second kind of factors, the physical factors affecting food choices included increased usage of drugs, decreased appetite, poor dental and physical status, and increased likelihood of using prescribed diets. Older people were found more likely to have chronic illnesses, dental problems, poor appetite, and to be taking medications for chronic illnesses than younger people (3). Some medications are commonly used among elderly, such as anti-depression medications. These may cause poor appetite or even causing anorexia (99). Physical functions limited by chronic illnesses, such as arthritis, could lead to the inability to prepare food, cook meals, and decrease food consumption (8). Chronic illnesses, such as diabetes mellitus, hypertension, or cardiovascular disease, are often associated with prescribed diets from doctors for the elderly. Elderly women were more likely to prescribe special diets for themselves than elderly men (85).

The third kind of factors, the socioeconomic factors, that might affect food choices included age, sex, accessibility to cooking facilities or to grocery stores, availability of transportation, familiarity with the foods, and skipping of meals (3). Elderly men on average consumed higher numbers of servings of fruits and vegetables than elderly women because elderly men had higher energy intakes than elderly women (3, 61). Elderly who live in their own homes often have more adequate cooking facilities or food storage than the elderly live in senior housing (3). Lack of the access of transportation to a food store was a problem for elderly women living in a metropolitan area (94). Elderly, as most of the people, prefer foods that are associated with pleasant experiences or related to their homes or

places of origin (103). Older people who ate alone did not make poor food choices, but consumed smaller amounts of foods, skipped meals, and consumed higher caloric meals away from home (99). Meal skipping might also be associated with lack of food resources, transportation, grocery stores, or money (17).

Asian American Elderly

The Asian American elderly people have been perceived to have a higher degree of nutrition-related health risks than the total elderly populations because of additional nutrition-related health risks, such as lack of health insurance and language barriers (4). Lack of health insurance can be a significant barrier of access to health care in the elderly population (17). Barriers of access to health care, language difficulty, and specific food preferences have been found to affect the food consumption among the Asian Americans (17, 29, 103). There are limited data found on the risk factors influencing the health status of the Asian American elderly.

The Asian American elderly subgroups share a common nutritional health risk factor, the language barrier of access to health care (17, 20, 28). There are limited data on the barriers of access to health care affecting the health status of Asian American elderly. Ineffective access to health care services might be related to lack of health insurance or language barriers which were considered as important

risk factors contributing to poor health status among minority elderly populations

(29, 73). Higher percentages of minority elderly were more likely to be without

health insurance than the Whites counterparts (Black elderly 2.7%, Hispanic elderly

5.5%, White elderly 0.9 %) (17). However, there is no study examining the effect

of health insurance coverage on the health status of Asian American elderly.

According to the report from the Department of Health and Human Services in

1990, minority elderly complied poorly with medical regimes, perhaps because of

financial difficulty (17). In both 1995 and 1996 Census data, 15% of Asian

American families lived below the poverty level where the poverty thresholds were

$9,219 in 1995 and $9,491 in 1996 for two persons age 65 or older in a household)

(100, 101). Language barriers or cultural beliefs may be the reasons for poor

accessibility to health or medical care systems among Asian Americans (73). The

1998 U.S. Bureau of Census reported that 72% of Asian American elderly age 65 or

older spoke English less than very well (59). There was no data reported on barrier

of access to health care affecting the health status of Asian American elderly.

The living arrangement is particularly unique for the Asian American

elderly (20). Family is the primary social unit and the Asian American elderly are

more likely to live with children and grandchildren within a family unit (73). The

Asian American elderly were also found likely to live in cities with family members

or live alone in an ethnic community (20). In addition, elderly Asians were found

less likely to live alone and more likely to be the caregivers for the younger

generation when living with family members (64).

Food choices are affected by acculturation, income, and family among Asian Americans and food preferences are found very much affected by ethnic, cultural, and religious backgrounds (42, 103, 114). For the Asian American populations who have a high degree of acculturation (the first generation has resided in the United States since 1950), the adaptation of Western diets may affect the diet of the second generation (114). According to the results from Tong's study in 1991 among Vietnamese American elderly, one third (34%) of participants reported that they would have purchased more Asian foods including fruits if they could afford to (42). Additionally, family is the most important unit among the Asian American society; therefore, social support of the family as a unit can also affect their food choices (73).

Acculturation can be a nutritional health risk factor affecting the health status of Asian Americans (12). Heart disease, diabetes, esophageal cancer, and osteoporosis are found to be the common diseases among the highly acculturated Asians American subgroups, such as Chinese, Japanese, Filipino, and Korean (12).

Nutrition Recommendation Policy

Nutrition recommendation policies have been emphasized for improving the health status of the elderly population. The most comprehensive dietary recommendations for all populations in the United States are the 1989 Recommended Dietary Allowances (RDAs) (104). However, the disadvantage of

using RDAs to evaluate the health status of elderly populations at advanced ages has been recognized as inadequate because the age cut-off range has not been identified clearly (105, 112). The 1995 Dietary Guideline and Food Guide Pyramid have been useful for elderly populations because of ease of understanding and inexpensive accessibility (107, 108). In addition, the Asian Food Guide Pyramid has been developed and published according to the dietary habits of the Asian population (115). There is an increasing demand for adequate dietary recommendations and dietary assessment methods for Asian American elderly (50, 113).

Total Elderly Population

The 1989 Recommended Dietary Allowances (RDAs) reported from the Food and Nutrition Board have been the most comprehensive nutrients reference standards developed from diet-balanced studies, animal studies, and epidemiological studies (104). The recommended allowances of nutrients tend to be consumed as part of a normal diet. The RDA standards are the safe and adequate levels reflecting the state of knowledge concerning a nutrient, its bioavailability, and variations among the U.S. population. These allowances have been used to evaluate and monitor the nutritional status among all populations. More current recommendations on calcium, vitamin D, fluoride, phosphorus, and

magnesium for the elderly population are included in the Dietary Reference Intakes

(DRI), which was released by the Institute of Medicine in 1997 (105, 106). The

nutrient recommendations for the elderly population at advanced ages will be

identified for young-olds, old-olds, and the oldest olds. However, the complete set

of recommendations will not be available until the end of year 2000.

The Dietary Guidelines and Food Guide Pyramid have often been used as

the nutrition assessment tool for all populations, especially for the elderly

population. The 1995 Dietary Guidelines (DG) for Americans is a general guideline

for the public that can be easily understood and practiced in the daily life (107).

The Food Guide Pyramid (FGP) puts the Dietary Guideline into practice (108). The

FGP describes the number of servings of each food group that individuals should

eat in a day in order to obtain adequate amounts of all the nutrients from their diet.

The recommendations of daily adequate intakes of numbers of servings from each

food group for the elderly were reported from the Human Nutrition Information

Service of the U.S. Department of Agriculture (109). The recommendations for the

elderly population are: 6 to 9 servings of grains, 3 to 4 servings of vegetables, 2 to 3

servings of fruits, 2 servings of milk, and 2 servings of meats. However, these

standards are useful only when the dietary data are accurately measured. Studies

have been directed to improve the accuracy of dietary assessment methods (110,

111).

Asian American Elderly

Culturally sensitive RDA recommendations for people in Southeast Asia were developed in the early 1980s but were incomplete and inadequate (113). According to the review by Tee in 1998, documentation of the Asian RDAs were incomplete, and the most relevant nutrients in that region included only energy, protein, calcium, iron, vitamin A, thiamin, riboflavin, folate, vitamin B12, vitamin C, and iodine (113). The nutrient recommendations for the elderly age cutoff points are different from one country to another, according to Tee (113). Age 60 was the cutoff point used for the RDAs from Vietnam and Singapore, and age 70 was the cutoff point used for the RDAs from Malaysia and the Philippines. However, most of the studies performed for the recommendations were not based on sufficient experimental data (113). There is an increasing demand for adequate nutrition recommendations for Asian American elderly (113).

The Asian Diet Pyramid was developed in 1995 according to the consumption frequency of each food item as compared to the traditional dietary habits of Asian populations (115). Grains, fruits, legumes and nuts, and vegetables are recommended as daily consumption food items. Fish and dairy products are recommended as optional daily consumption food items. Sweets, eggs, and poultry are recommended as weekly consumption food items and meats as monthly consumption food items. However, according to Lau et al. in 1998, the 1992 Food Guide Pyramid used widely in the United States among the population should be

the food consumption guide recommended for Chinese populations living in the United States (117).

Nutrition Assessment Methods

Nutrition assessment is more than the evaluation of nutritional status, it is a comprehensive process of identifying individuals and populations at nutritional risk by measuring indicators of dietary or nutrition-related factors in order to determine further actions of planning, implementing, and evaluating (84). Using nutrition assessment properly can be instrumental in identifying nutritional risk status among all populations. Nutrition assessment often includes four kinds: anthropometric, biochemical, clinical, and dietary assessment. These assessments have been widely used in all age populations, but they become important to this study when considering the advantages and disadvantages of each nutrition assessment method for the total elderly and the Asian American elderly populations.

Total Elderly Population

Anthropometic measurements are frequently used in clinical settings and nutrition surveys for physical assessment, including weight, height, skinfolds, and circumference measurements, to determine body composition (84). Body weight measurement can be obtained from a calibrated weight scale. When older persons

become bed- or chair-bound, a calibrated wheelchair or bed beam should be used. Knee height measurement is highly recommended for elderly rather than a stadiometer because it can be done when a person is either standing up or sitting down. Skinfold measurements are taken by a skinfold caliper and can be used to calculate the person's circumference. However, skinfold measurements can be inaccurate for persons with decreased elasticity of the skin, which universally occurs among elderly people (84).

Biochemical assessment is more sensitive than anthropometric measurement in determining the nutritional health risk status because biochemical parameters change before the same changes can be detected by other methods (55). Blood samples are mainly used for biochemical analysis. Reliable diagnostic indicators of protein energy malnutrition are serum albumin, transferrin, hemoglobin, serum cholesterol, and total lymphocyte count. Serum albumin concentrations do not decrease with age to a significant degree in a healthy older person (3). Hypoalbumin may result from certain gastrointestinal and renal diseases, liver disease, hypothyroidism, congestive heart failure, infection, or zinc deficiency. A serum level should not be lower than 3.5 g/dl among normally hydrated adults (55). High blood cholesterol, elevated low-density lipoprote (LDL), and decreased high density lipoprotein (HDL) are related to the risk of coronary artery disease (91). The National Cholesterol Education Program considers a total cholesterol level above 240 mg/dl and LDL level above 160 mg/dl as high risks for hypercholesterolemia.

Clinical changes occur in appearance suggesting nutritional problems, such as edema, bruises, skin lesions, rashes, scaly skin, and sores. Also, the clinical changes can affect the functional status among the elderly population (84). Two functional status measurements which are commonly used are activities of daily living (ADLs) and instrumental activities of daily living (IADLs). Nutrition-related activies of daily livings are eating (related to ADLs), shopping, preparing meals, and transportation (related to IADLs). In addition, cognitive status is included in clinical assessment, which can also affect food consumption (84).

Dietary assessment has been used to evaluate the nutritional risk of an individual or a population. There are five different dietary assessment methods: 24-hour recall, estimated food record, weighted food record, dietary history, and the food frequency questionnaire. There are disadvantages and advantages for each method (35). For elderly subjects, 24-hour dietary recall may be problematic because they were less likely to recall what they ate the day before. Dietary history may take more than thirty minutes to interview one subject and can be very costly, which may be a dilemma for interviewing culturally diverse groups (35, 118). The estimated food record and weighted food record require conscientiousness and highly motivated participants. The food frequency questionnaire is the method estimating the amount of foods consumed habitually (35). However, the food items listed on the food frequency questionnaire may be limited to the availability for cultural foods (118).

Asian American Elderly

The relationship between the anthropometric assessment standards for the US population, such as body weight, body height, triceps skin fold (TSF), midarm circumference (MAC), and midarm muscle circumference (MAMC), has been not been accurately examined for the Asian male and female population, according to Wu et al. in 1994 (116). Among a total of 722 healthy Chinese males and females, without diabetes, tuberculosis, malignancy, liver or renal disorders, and other unknown etiology, who were at the 50th percentile according to the TSF among the Chinese population standard would fall below the 50th to 25th percentile among the U.S. population standard. The MAMC of Individuals who were at the 50th percentile among the Chinese population would fall below the 25th percentile according to the U.S. population standard (116).

Several nutritional assessment methods have been used to assess the dietary patterns among Asian Americans (38-42, 156). In 1994, Lee et al. developed an 84-item semiquantitative Dietary History Questionnaire for assessing food consumption among 74 Chinese Americans (118). After cross comparison with a 1-day food recall, the results showed that 50% of nutrients were correctly estimated in the same highest quartile as in the food recall. Hankin et al. had also validated a quantitative 47-item Diet History method and cross-validated with one-year food records to assess food consumption among 262 Asian Americans in Hawaii, including Chinese, Filipino, Hawaiian, and Japanese, in 1994 (120). Results

showed the Diet History method had a high correlation with food records in determining nutrient consumption. However, both dietary assessment methods from the two studies were either limited to the specific ethnic group or to the geographic location (118, 119).

Two previous studies have used dietary assessment to evaluate the food consumption among Asian Americans and Asian American elderly (36, 42). However, increasing errors from the results of dietary assessment methods have been discussed (110). For example, significantly underreported food intakes among all age groups were one of the main concerns of dietary data (111). The inability of the elderly to recall food intake as a result of memory limitation was another problem for dietary assessment (35). Dietary interviews using visual aids can assist subjects in recalling food items they have consumed (43, 118). However, there has been no reliable dietary assessment method that has been validated among all subgroups of the Asian American elderly (118). Consequently, 24-hour dietary recall was used as the dietary assessment method among research for Asian Americans and Asian American elderly (36, 42).

Nutrition Screening Methods

Preventive strategy of nutrition intervention methods, such as nutrition screening, has been suggested by the Committee of the Food and Nutrition Board from the National Research Council to reduce dietary risks for chronic illnesses

(29). Nutrition screening has been defined as the process of discovering characteristics known to be associated with dietary or nutritional problems, according to the Consensus Conference of the Nutrition Screening Initiative (140). Nutrition intervention is an action taken to decrease those characteristics that are risk factors of causing poor nutrition status among populations (140). These preventative measures can be used to detect risk before disease occurs and reduce the risk of disease (10, 38). Nutrition screening has been used as an appropriate process within a significant, but relatively small, proportion of any population. Those populations at risk could be identified with nutrition screening tests, which could be applied to a nutrition screening program, leading to effective nutrition intervention, and which is considered as a public health benefit (45). Nutrition screening was designed for people who appear likely to have diseases and should be investigated further for a final diagnosis (10). Screening tests have been used for public health to determine the pre-symptomatic disease symptoms, called secondary prevention; or for risk factors to determine disease or disability situations, called primary prevention. When the screenings begin, the health professionals are the ones to take the initiative and inform the public of the problems and further help to lead the public in solving them, according to Reiser et al. in 1999 (146).

Total Elderly Population

The Nutrition Screening Initiative has been one of the primary preventive screening tools for the ambulatory elderly population who are at nutritional risk, according to a report by Rush in 1997 (11). The nutrition screening tools from the Nutrition Screening Initiative have been recognized as valuable nutrition preventive tools for promoting quality of life among the elderly population (139-141). These nutrition screening tools have been used extensively to evaluate the nutritional health status among the elderly populations (122-130). However, there have been limited studies using these screening tools to evaluate the nutritional health status among minority elderly populations (45). Therefore, a culturally specific and economical Nutrition Screening Initiative could be one of the useful tools in order to raise the public awareness of diseases among Asian minority population.

The nutrition screening tools from the Nutrition Screening Initiative have been intensively used as the nutrition screening tools to determine the nutritional health risk status among the total elderly population (122-129, 147-148). The nutrition screening tools include the DETERMINE Checklist, Level I Screen, and Level II Screen. The Nutrition Screening Initiative is a five-year multifaceted effort of the American Academy of Family Physicians, The American Dietetic Association, and the National Council on Aging, Inc. which started in 1990. The DETERMINE Checklist has been a public awareness tool concerning different aspects of nutritional risk factors among the elderly, using an acronym for disease

conditions, eating poorly, tooth loss, economic hardship, reduced social contact,

multiple medications, involuntary weight loss or weight gain, needs assistance in

self care, and elderly age over 80 (130-136). The checklist can be self-administered

or conducted by anyone who interacts with older family members, friends, or

caregivers (135, 137-139, 152-153). The Level I Screen provides a simple method

for the elderly individuals who should be referred for a further evaluation to

professionals or a possible intervention to prevent further deterioration. The Level

II Screen provides sensitive measurements for health care professionals to use as a

part of health examinations (140).

Spangler and Eigenbrod (129) in 1995 assessed the nutrition risks among

332 free-living and non-homebound elderly using the DETERMINE Checklist at

Ball State. They found more than half of the elderly respondents had moderate or

high nutritional risks. The problem of eating fewer than two meals a day was

related to tooth or mouth problems, insufficient money for food, and limited

physical ability to shop, cook, or feed oneself. Similar results were found in 1996

Coulston's study in California as well as the 1995 Garofalo et al.'s study in New

Jersey (123, 127). In addition, eating alone was found as the most common

nutrition risk factor among the elderly population (127, 134).

The checklist helped older people recognize that they might be at an

increased risk for a nutritional problem and had warning signs of poor nutritional

status. Many people, especially the elderly population, became aware of their

health status when they sought professional help and reduced their nutrition-related

health problems (34). Reiser et al. in 1999 (146) have reported 67% of the senior nutrition program participants have achieved the nutrition intervention goals after being identified as at high nutritional risk from the DETERMINE Checklist (score more than 6). The nutrition intervention goals include increased meal frequency, weight gain or weight loss, increased intake of a specific food group, improved ability to read and understand food labeling, lower sodium and fat intake, increased muscle strength, and increased calcium intake.

The Level I Screen and Level II Screen of Nutrition Screening Initiative provide more specific diagnostic information on nutritional status for elderly individuals in order for further medical or community services to be provided (8). Those two nutrition screening tools could be conducted by professionals in health or social service programs and the Level II Screen could be completed in physical examination by health care professionals (149). Herndon (33) at Purdue University reported in 1995 that unwanted weight loss, functional limitations, and special diet were found to be the most commonly reported nutritional risk factors among home-delivered meals participants using the Level I Screen.

Nutrition Risk Index (NRI) was the other nutrition screening process that had been used in predicting nutritional risks among ambulatory elderly populations (144). The NRI is comprised of 16 items which included five dimensions for nutritional risks: mechanics of food intake, prescribed dietary restrictions, morbid conditions affecting food intake, discomfort associated with the outcomes of food intake, and significant changes in dietary habits. However, levels of internal

consistency were low and the construction of the instrument did not follow a

conceptual model (7). Therefore, Reuben et al. in 1995, suggested that the NRI was

not an appropriate nutrition screening tool for elderly populations (7).

Asian American Elderly

Zylatra used a culturally specific DETERMINE Checklist to evaluate the

nutritional status among minority elderly, including 10% of Asian American; 2.5%

of Hispanics; 2.5% of American Indians; and 1.1% of African American at

Washington State in 1995 (45). The DETERMINE Checklist in this study had been

translated into three Asian languages: Vietnamese, Chinese, and Cambodian.

However, results only showed that there was a significant difference of nutritional

risk scores between the minority elderly as a group and the White elderly. No other

study was identified that used nutrition screening tools from the Nutrition

Screening Initiative to evaluate the nutritional health status among Asian American

elderly populations.

Evaluation of Nutrition Assessment Methods

The efficacy of nutrition screening tools is determined by evaluating the

validity of the tools, which includes sensitivity and specificity (44). High

sensitivity of screening tools means the screening process can positively determine

the individuals who are at nutritional risk, and high specificity of screening tools

means the screening process can negatively determine the individuals who are not

at nutritional risk. If the screening tools are sensitive, the individuals at nutritional

risk will be screened as at nutritional risk (true-positive test results). A nutrition

screening tool with poor sensitivity will misclassify unhealthy individuals with a

condition of free of nutritional risks. If the screening tools are highly specific, the

individuals who are not malnourished will be recognized as not at nutritional risk

(true-negative test results). Poor specificity of nutrition screening tool will

determine healthy individuals who test positive for nutritional risks.

The sensitivity and specificity have been recognized as valuable evaluation

criteria of nutrition screening tools (44). However, there has been a limited number

of research on applying these evaluation criteria to the assessing of nutrition

screening tools. Posner et al. (134) in 1993 have tested the sensitivity and

specificity of the DETERMINE Checklist in predicting nutritional health status

comparing to the adequacy of the diet from the 24-hour dietary recall and self-

perceived health status among 449 elderly Medicare recipients living independently

in the 1990 New England Elders Dental Study. Research results showed that the

sensitivity and specificity of the DETERMINE Checklist were on average about

41% and 85%, respectively. These results showed nearly 70% of elderly perceiving

themselves to be in good to excellent health, but 55% of them having two or more

chronic diseases and 70% of them consuming one or more than one nutrients below

2/3 of RDAs. Many of those chronic disease conditions could be improved with proper nutrition interventions. However, Posner et al. suggested that the research samples were mainly Whites, and the research results could not apply to non-White populations. In addition, the sensitivity and specificity were likely to be overstated because the same population was used to determine the scoring system of the DETERMINE Checklist.

Sensitivity and specificity have also been used to evaluate the screening purposes other than nutrition, such as the 1994 mortality study by Frisoni et al., the 1996 functional disability study by Moore et al., and the 1998 mental health status study by Katzman et al. (142, 143, 144). The research results showing high sensitivity and specificity from those studies were calculated out as: 80% and 78% for Frisoni et al.'s study; 68% and 94% for Moore et al.'s study; and 75% and 74% for Katzman et al.'s study, respectively.

METHODOLOGY

Nutrition-related risk factors could be identified through the implementation of the nutrition preventive strategies, such as nutrition intervention through nutrition assessment and screening, for the total elderly population (6-10). Few dietary studies and a limited number of nutrition assessment studies evaluated the nutrition status of the Asian Americans (36-40) and the Asian American elderly (41, 42, 45, 114). However, investigations of the interactions between socioeconomic risk factors and nutritional health status were needed among the minority elderly population, such as the Asian American elderly (12). Additional nutrition-related health risk factors, such as the acculturation, language competency, attitude and awareness of nutrition, accessibility to Asian foods, receipt of government benefits, health insurance coverage, and health status, might have impacts on the nutritional health risk status among the Asian American elderly (17, 20, 28, 37, 38). Culturally sensitive nutrition assessment tools were also essential to evaluate the adequacy of food intakes and to determine the nutrition health status in this projected fastest growing elderly minority population who may be at higher nutritional risk because of the additional nutrition-related health risk factors than the total elderly population (2-4, 50).

Universal nutrition screening tools, such as the standardized DETERMINE Checklist and Level I Screen (Appendix 1), have been used to determine the nutritional health risk status among the total elderly population (33, 121-129). The

DETERMINE Checklist and the Level I Screen were cooperative efforts of the American Family Physician, the American Dietetic Association, and Council for Aging, Inc (33). Those nutrition screening tools have increased the awareness in areas which the elderly individuals may have potential risks, and further seeking professional assistants in the risk areas. However, the DETERMINE Checklist has not been examined for its efficacy, including the sensitivity and specificity, in determining the nutritional health risk status for the Asian American elderly (11). Therefore, the purpose of this case study research was to examine the efficacy of using the universal nutrition health risk screen tool, the DETERMINE Checklist (Appendix 1), for the Chinese elderly populations. The case study was used in the context of the specific Chinese elderly cultural group (167).

The research was conducted in two phases; (1) the development of culturally appropriate nutrition assessment tools, which were achieved through a focus group interview and a pilot study; and (2) nutrition and health status interviews, which were completed using the Nutrition and Health Related Questionnaire. The development of culturally appropriate nutrition assessment tools was achieved through a focus group interview (n=6) to generate a food inventory list and Chinese food photos. A pilot study (n=5) was to evaluate the nutrition and health status interviews process using the culturally appropriate nutrition assessment tools, the food inventory list and Chinese food photos. The food inventory list and Chinese food photos were used as visual aids in assessing the food intakes quantitatively in phase two, the nutrition and health status

interviews. The purpose of the nutrition and health status interviews was to determine the adequacy of food consumption and to evaluate the nutritional health risk status using the Nutrition and Health Related Questionnaire.

The Nutrition and Health Related Questionnaire (Appendix 7) included a dietary assessment method, a combined questionnaire from the DETERMINE Checklist and Level I Screen (Appendix 1), and additional nutrition-related health risk factors. The food consumption data was collected through a dietary assessment method, the 24-hour dietary recall (35). Replicate and similar questions from the DETERMINE Checklist and Level I Screen were combined; therefore, the two questionnaires were integrated and adapted into one questionnaire, the Nutrition and Health Related Questionnaire. The additional nutritional-health related risk factors included in the questionnaire were the demographics, acculturation, English language competency, attitude and awareness of nutrition, and accessibility to Asian foods. Additionally, receipt of government benefits, health insurance coverage, and health status may have impacts on the nutritional health risk status.

## Research Question, Purposes, and Hypotheses of the Study

The research question of the case study was: Can standardized nutrition screening tools identify the nutritional health risk status of Chinese elderly? The case study was developed to study a specific type of social unit or context of a cultural group, such as the Chinese elderly population as reported by Newman

(167). The purposes of the study involved; (1) evaluation of the nutritional health risk status among Chinese elderly; (2) determination the adequacy of dietary intake among Chinese elderly using a dietary assessment method; and (3) identification of sensitivity and specificity of the nutritional health risk screening tool for Chinese elderly.

The null hypotheses for the study were considered from two aspects related to the nutritional health for the Chinese elderly: (1) adequacy of food intake; and (2) nutritional health risk status. Three null hypotheses were:

Ho1: The DETERMINE Checklist and Level I Screen in combination with 24-hour dietary recall cannot identify nutritional health risk indicators.

Ho2: Chinese elderly do not have adequate food intake.

Ho3: Nutritional health risk status is not associated with the adequacy of food intake.

## Participants

Chinese elderly age 70 or above were invited to participate in the research. The definition of the participant's race could only be identified by each individual as suggested by U.S. Bureau of Census (59). The term "Chinese" used throughout the research included Chinese, Chinese Americans, and Asian Chinese, who recognized themselves as "Chinese", were all included in the term "Chinese." Among the Oregon total population, Asian Americans represented about 2.4% in

1990 (16). Within that proportion, Chinese (0.5%) represented the highest proportion of Asian population compared to Japanese (0.4%) and Korean (0.3%) (16). Elderly Asian American Oregonians represented about 0.9% of elderly age 65 or older which is higher than other minority elderly populations (0.8% Hispanics; 0.8% Blacks; 0.6% American Indians) in 1992 (150, 157). As age increased among the elderly population, the nutritional health risk status increased (151). Elderly people age 70 or older were found more likely to have physical function limitations and an increased number of chronic conditions (151). Chinese elderly aged 70 or older living independently in houses or apartments in the Northwest areas were invited to participate in this case study research.

The purposive sampling method and snow-ball sampling method were used for this study to recruit the Chinese elderly participants. Purposive sampling, a non-probability and non-randomized sampling technique, was used to obtain difficult-to-reach culturally specific populations. The snow-ball sampling was used when the research participants were likely to encourage and to invite their friends who shared similar culture backgrounds and/or experiences to participate in the research within a cultural community (162, 167). The Asian American elderly, including the Chinese elderly, were found more likely to live in a cultural community, such as Portland's China Town or Little Tokyo, and this group was considered a difficult-to-reach population (64). A total of sixty Chinese elderly aged 70 or older were invited to participate in the study. An estimated 37 sample size of Chinese elderly would reach the research power of 95%. The estimated

sample size was calculated using the estimation of 2.4% Asian American living in Oregon from the sample size estimation formula suggested by Thompson (estimated sample size = $\sigma_{variance} \times Z^2_\alpha / \Sigma^2$; $\sigma_{variance} = p (1- p)$, p = 2.4%, Z=1.96 and $\Sigma = 0.05$ at 95% confidence interval) (157, 160).

A thirty-mile radius around Portland, Beaverton, Salem, Corvallis, and Eugene in Western Oregon were the recruitment areas of this study. Asian Americans, including the Chinese, tended to live in metropolitan areas according to McBride et al. (64). The metropolitan areas were defined as a county with adjacent urbanized areas with a population of 50,000 or more and a total population of 100,000 or more according to the reported from Van Nostrand (158). In the 1993 race estimates for Oregon, Asian Americans were more likely to live in Washington County, Clackamas County, Multnomah County, Marion County, Benton County, and Lane County, which were the cities of Portland, Salem, and Eugene are located, respectively (159). Therefore, Portland, Salem, and Eugene were the three-targeted metropolitan cities to recruit the Chinese elderly research sample, which had a population of more than 100,000 according to the 1997 population the incorporated cities in Oregon (161). The urbanized cities of Beaverton, which is adjacent to Portland and located in Washington County, and Corvallis, which is 50 miles from the city of Eugene and located in Benton County, reported a population of more than 50,000 (161). Therefore, Beaverton and Corvallis were also chosen to be the recruitment sites of the Chinese elderly research participants in the study.

Initial indirect contacts were made through sending the research invitation letter and postage paid envelopes that were mailed to minority health offices, Asian cultural organizations, senior centers, and students associations to generate a list of potential participants. Research invitation letters (see an example of invitation letter in Appendix 2) stating the primary research question and purposes of this study for recruiting Chinese elderly participants were mailed to the possible recruitment centers, such as the State Office of Minority Health, county senior centers, and the Chinese Chamber of Commerce (see a list of selected contacting addresses in Appendix 4). Additional Chinese elderly participants were recruited through the email messages of electronic listserves of the Chinese Student Association at Portland State University, Oregon State University, and the University of Oregon using a snowball sampling technique (162). The snowball sampling technique was used in recruiting the population who were hard-to-reach, such as the Chinese elderly participants in the study. The technique could be applied effectively when the initial contact person referred their friends or family members to participate in a research or activity within a culture community (162, 167).

Asian churches, Asian food stores, Asian and non-Asian restaurants, senior clubs, professional groups, and national, state, or local Asian and Pacific Islander organizations of Asian American elderly also were included in the initial indirect contacts for recruiting Chinese elderly research participants. These types of contacts were identified in a previous publication of the American Association of

Retired Persons (163). Research invitation letters with postage paid envelopes also were sent out to religious leaders, owners of Asian grocery stores or restaurants, and the presidents of professional groups or organizations to generate a list of potential participants. Printed advertisements with contact research persons, phone numbers, and addresses written in Chinese describing the primary research question and purposes of the study were sent out with a request to post in culture specific grocery stores, restaurants, organizations, and a local Chinese newspaper. A total of twenty restaurants, 10 Asian cultural specific restaurants and 10 non-Asian cultural specific restaurants within each city of Portland, Beaverton, Salem, Corvallis, and Eugene, were selected for recruitment purposes.

The researcher made direct contacts with the potential participants from the referrals made from the indirect contacts, such as church leaders, through the maximum of three personal telephone calls. Contacting the potential participants on a one-on-one basis has proven to be a successful method for inviting elderly research participants to ensure a low rate of absenteeism. This method was suggested by Greenwell and Spillman in 1996 (43). A maximum of three tries of direct contacts was made to each prospective participant as the same contacting method had been used in the 1995 Continuing Survey of Food Intakes by Individuals study conducted by the U.S. Department of Agriculture (164).

The approval for human subject protection using the exempt procedure from the Internal Review Broad (IRB) of Oregon State University had been obtained by the researcher prior to the research. All the names of participants were kept

anonymous and identified by assigned numbers. Any information obtained from

the participants was kept confidential, only primary researchers had the access to

the data, and research results were reported as a group.

## Development of Nutrition Assessment Tools

The development of nutrition assessment tools, including the food inventory

list and Chinese food photos, were completed through a focus group interview and

a pilot study. The food inventory list and Chinese food photos (Appendix 12) were

used as the visual aids in the nutrition health status interviews. The nutrition health

status interviews evaluated the nutritional health risk status of the Chinese elderly

using the Nutrition and Health Related Questionnaire. The visual aids were used to

provide a quantitative dietary assessment method for 24-hour dietary recall, which

was included in the Nutrition and Health Related Questionnaire. A pilot study was

used to evaluate the usage of the food inventory list and Chinese food photos to

assess the food intakes data in the Nutrition and Health Related Questionnaire and

the nutrition and health status interview process. The content validated informed

consent forms in either Chinese or English were available for the Chinese elderly

participants to choose (Appendix 8).

Food Inventory List and Chinese Food Photos: Focus Group

The food inventory list and Chinese food photos were generated through a focus group. Recruitment of the Chinese elderly focus group participants to generate these research tools was achieved through personal phone calls to a pool of potential research participants. Personal bilingual phone calls were made to invite the Chinese elderly to participate in the focus group interview using bilingual interview materials. The Chinese elderly who shared the same language competency (who were able to speak or read English or Chinese or both) were invited to participate in an audio-taped focus group interview. Six Chinese elderly age 70 or older living independently in their homes or apartments were invited from a pool of twelve Chinese elderly who were referred from researcher's contacts or friends of the potential research participants. The focus group interview location was arranged at a local Asian restaurant, which was easily accessible for all the participants. All of the research participants were invited to stay for lunch followed by the focus group interview to encourage the completion of the focus group interview.

The Chinese elderly aged 70 or older (n=6) who agreed to participate in the focus group interview discussed the commonly eaten foods for each meal of the day for about one hour. The focus group interview method was used to stimulate the thinking of a group of people to discuss the same issue, their commonly eaten food items according to Newman (167). The researcher asked the questions (Appendix

5) about their commonly eaten foods for breakfast, lunch, dinner, and snacks, and the Chinese elderly focus group participants (n=6) took turns talking about the food items they usually ate for each meal during the interview.

Followed by the focus group interview, each Chinese elderly participant was asked to take Chinese food photos from the foods that they prepared based on the commonly eaten foods they had identified during the focus group interview. Each Chinese elderly focus group participant received two 27-exposure one-time use cameras loaded with color film and a written instruction packet (Appendix 6). The written instruction packets included the directions for taking food photos, one-serving size explanation sheet, a figure illustrating how to take food photos, and a documentation of the food photos. The directions on taking food photos instructed the elderly focus group participant step-by-step on how to separate each food ingredient into one-serving size according to the one-servings size explanation sheet. The researcher also showed and explained the amount of one serving size for each food group according to the 1995 U.S. Food Guide Pyramid to the focus group participants (108). The figure showed the participant the pose to take food photos at a 42-degree angle above the horizon, which was similar to the normal dining position viewing at their plate while sitting by a dining table (154, 155). It also was required that the participants to record the name of the food item sequentially after each photo was taken. There were approximately 48 Asian foods that were eaten from the food inventory list, as reported in a previous study done by Hankin et al.

(120). Therefore, the two 27-exposure one-time use cameras were able to include all possible commonly eaten Chinese food items in the focus group research.

The two one-time use cameras were to be returned by mail in postage-paid envelopes within one month. According to the Salant and Dillman's technique of mailed surveys, follow-up reminder letters with stamped, addressed return envelopes were sent out at the intervals of one week, ten days, and three weeks after the focus group interview was completed (86, Appendix 2). After receiving the cameras from the focus group participants, the color photos were developed, and each food item was sorted and arranged according to the food groups from the U.S Food Guide Pyramid. The color food photos were used as the visuals aid in the nutrition and health status interviews. Visual aids, such as colored photographs, can help people age 65 or older identify the amount of foods they eat in the dietary assessment (154-156). The Chinese food photos were labeled in both Chinese and English. Copies of the developed color pictures arranged in photo albums were sent to each of the Chinese elderly focus group participant as the incentive and gratitude for participating in the interview.

### Nutrition and Health Related Questionnaire: Pilot Study

A pilot study (n=5) was used to evaluate the usage of the food inventory list and Chinese food photos during the 24-hour dietary recall in the nutrition and health status interview process. The food inventory list and Chinese food photos

were used to assess the types and amounts of food that were consumed in the previous 24-hours. The nutrition health status interviews were to evaluate the nutritional health risk status of the Chinese elderly using the Nutrition and Health Related Questionnaire. Five Chinese elderly participants were recruited to be interviewed face-to-face. Both Chinese and English versions of informed consent forms (Appendix 8) and the Nutrition and Health Related Questionnaire (Appendix 7) were available for the pilot study participant to choose.

The purpose of the Nutrition and Health Related Questionnaire was to evaluate the adequacy of food consumption and nutritional health risk status. It included a dietary assessment method, questions on nutritional health risk, and nutrition-related risk factors. The dietary assessment method was the 24-hour dietary recall, which was adapted from the dietary recall method used in the 1987-1988 Nationwide Food Consumption Survey (31). The nutritional health risk questions included the integrated questions from the DETERMINE Checklist and Level I Screen. The nutrition-related risk factors included demographics, acculturation, attitude and awareness of nutrition, English language competency, cultural food accessibility, receiving government benefits, health insurance coverage, and health status.

Twenty-four hour dietary recall was used to collect food consumption information among the Chinese elderly in the nutrition and health status interviews, which was not limited to the food items listed in the food frequency questionnaire. Several earlier dietary assessment studies used the 24-hour dietary recall method to

evaluate the nutritional health status among Asian Americans or Asian American elderly (36, 42, 114). The food frequency questionnaire had been reviewed by Gibson to be one of the better dietary assessment methods for assessing usual food habits because it reflects food items and frequency of foods that were eaten in a year (35). However, the food frequency questionnaire was limited to assess the food consumption data among the populations who usually consumed those food items on the questionnaire (35). Lee et al. in 1994 developed a Chinese version of an 84-item Food Frequency Questionnaire by modification of the 130 food items of Willett's Semi-Quantitative Food Frequency Questionnaire (118), which was restricted to the geographic availability of the food items on the questionnaire. A 24-hour dietary recall method was chosen to be the dietary assessment method in this research, which also was used by Tong and Kim et al. who had used this method to assess dietary habits among Asian American elderly (42, 114).

The nutrition health status of the Chinese elderly was assessed using the Nutrition and Health Related Questionnaire including the combined questions from the DETERMINE Checklist and Level I Screen (Appendix 7) and was used with permission from the Nutrition Screening Initiative (Appendix 1). Questions with multiple aspects in the DETERMINE Checklist included eating few fruits, vegetables, or milk products, were modified into three separate questions because the Chinese elderly were more likely to be lactose intolerance and consume less milk products as reported in the Lau et al.'s study (117). Therefore, similar questions in the DETERMINE Checklist and Level I Screen were combined and

only asked once. For example, the question in the DETERMINE Checklist, "I eat few fruits or vegetables, or milk products" was similar to three questions in the eating habits section of the Level I Screen, "eats vegetables two or fewer times daily", "eats milk or milk products once or not at all daily", and "eats fruit or drinks fruit juice once or not al all daily". The questions were modified into "do you eat vegetables two or fewer times daily?", "do you eat milk or milk products once or not at all daily?", and "do you eat fruits or drink fruit juices once or not at all daily?". Answers to each modified question from the DETERMINE Checklist and Level I Screen were "always", "sometimes", or "never" instead of "yes" or "no." The questions on the ability to perform physical functions, such as shop, cook and feed yourself, were also asked separately. The limited physical function affecting the health status could be related to the means of access other than the ability to perform according to the report from Cohen et al. (201).

The content validity of the Chinese version of the Nutrition and Health Related Questionnaire was examined prior to the nutrition and health status interviews (Appendix 7). Content validity was used in a situation where researchers had specified the content of a definition, which was represented in a measurement (167). The Nutrition and Health Related Questionnaire was first developed in English, and then translated into Chinese by a native Chinese language speaker. A different native Chinese language speaker back-translated the translated the Chinese language version of the questionnaire into English. The researcher evaluated the differences of content between the original English version

questionnaire and the translated English version questionnaire. This cross-cultural translation method has been validated and reported in an earlier study done by Sperber et al. (185). The DETERMINE Checklist in Chinese was developed by Zylstra which was used in this research with permission (45).

## Data Collection and Analysis: Nutrition and Health Status Interviews

Sixty Chinese elderly age 70 or older who agreed to participate in the nutrition and health status interviews were asked to sign an informed consent form prior to participating in the interviews (Appendix 8). The participants received a mailed copy of their own signed informed consent forms after the interviews. Face-to-face interviews were chosen as the interview method, which had been reported to be the most successful method for free-living elderly due to the tendency of low response rates of mailed surveys, according to Kaldenberg et al. in 1994 and Eaker et al. in 1998 (165, 166). The face-to-face interviews were scheduled through personal telephone contacts a maximum of three times. The face-to-face interview at a maximum thirty-minute duration was an appropriate interviewing technique for Chinese elderly, according to the previous study in assessing actual food consumption among Asian Americans (118). Translators were available to assist the interviewees if the Chinese elderly persons were not comfortable speaking English during the interviews. Family members or caregivers of the elderly participants were strongly encouraged to participate in the interviews with the

participants to increase the accuracy of recalled dietary information in the 24-hour dietary recall as suggested by Gibson (35).

During the dietary assessment, the 24-hour dietary recall, the researcher asked the participants about the food items that were consumed in the previous 24 hours and recorded the detailed amounts of food using visual aids accordingly. Participants' family members or participants' caregivers also were invited to participate in dietary recall interviews. Color photos of Chinese food photos and the food inventory list developed from the focus group interview were used to aid Chinese elderly participants in identifying the types and amounts of foods eaten in the previous 24 hours. The interviewers recorded detailed descriptions of all food ingredients and beverages that were consumed by the participants. In the case of mixed food items in a menu dish, each food ingredient was identified separately. Cooking methods and brand names of food products were recorded. Household measuring units for cooking purposes, such as measuring cups, teaspoons, and tablespoons, were used to provide visual aids of recalling the best estimation of the consumed food proportions.

Weight and height of the elderly participants using a weight scale and Frankfort horizontal plane were measured at the time of the interviews, depending upon the stature and mobility of the participants (84). Weight measurements were taken and recorded as the self-reported information if the participants refused to be weighed. If the elderly participants could not stand up straight because of back or loss of bone density problems, such as spinal curvature, knee height measurement

was used as it served as a the height measurement (168). Knee height was

measured by using knee height caliper. Knee height measurements were calculated

and used to predict the normal height of the elderly participants (169). Predicted

height was calculated from the knee height measurements using the following

formulas for elderly men or women (175).

- Elderly women:

  Predicted height (cm) =
  [2.04 x knee height (cm)] - [1.03 x age (years)] + 62.64

- Elderly men:

  Predicted height (cm) =
  [2.98 x knee height (cm)] - [0.01 x age (years)] + 8.15


The adequacy of food intake among the elderly participants was evaluated

by comparing the computed number of serving of foods eaten from each food group

with the recommended amount of each food group from the Food Guide Pyramid

and were calculated using the food variety score (FVS). The Food Guide Pyramid

was used by earlier researches to reflect culturally sensitive food consumption

among specific populations (115, 170). This guide was considered a better standard

for determining the adequacy of food intakes among the Chinese elderly population

as a result of the limited nutrient analysis data of cultural foods in the Nutrient Data

Bank from the U.S. Department of Agriculture (171). The FVS was the sum of

scores, which were assigned for each food group times the number of servings that

were eaten. The nutritional health risk status was determined through the standards

of the DETERMINE Checklist. The evaluation of the DETERMINE Checklist was calculated by cross-comparison of the adequacy of food consumption and the nutritional health risk status.

The food consumption data collected from the 24-hour dietary recall were sorted and categorized into six food groups, according to the U.S. Food Guide Pyramid (108). The six food groups included grains, vegetables, fruits, meat, milk, and added fats and sugars. The amount of foods eaten were calculated to nearest one tenth of a serving size and converted into numbers of servings of food consumed per day, according to the definition of serving size from the U.S. Department of Agriculture's Daily Food Guide (108). The adequacy of food intake was determined by comparing the number of servings of food consumed with the recommended amounts of servings for each food group. The recommended amounts of servings of each food group for older adults were 6 to 9 servings of grains, 3 to 4 servings of vegetables, 2 to 3 servings of fruits, 2 servings of milk products, and 2 servings of meats, according to the recommendations from the Human Nutrition Information Services of the U.S. Department of Agriculture (109). The minimum recommended number of servings for each food group was used as the criteria of adequate food consumption for meeting energy needs among the elderly populations.

The food consumption variety score (FVS) was used to evaluate the overall diet quality. The method was selected because it was successfully used by Kant and Thompson in 1997 and by Guthrie and Scheer in 1981 who evaluated the data

based on the recommended number of servings of foods from the Food Guide

Pyramid (172, 173). The total score can range from 0 to 20 with 4 points each for

daily intakes of more or equal to the numbers of servings recommended from each

of the five food groups. The recommended food intake of servings for each food

group were 2 servings per day each for fruit, dairy, and meats; 3 servings per day

for vegetables; and 6 servings per day for grains. Each serving of meat and dairy

were counted as two points, and each serving of fruit, vegetable, and grain were

counted as one point. The amount of foods eaten less than the recommended

servings per day was only counted as a proportion of the standard score (173). For

example, if a person eats half serving of meat and half serving of vegetables, the

person's FVS will only be scored as the sum of 1.5 points. The higher the food

variety score (FVS), the more likely the elderly individual was eating adequately

and less likely to be at nutritional risk. A FVS scored above 16 (equal or above

80% of the total score) implied a good diet; FVS scored between 10 to 16 (between

50% to 80% of the total score), implied a diet that needs improvement; FVS scored

below 10 (equal or below 50% of the total score) implied a poor diet, according to

the evaluation criteria used to evaluate the diet quality of minority population, the

American Indians, in 1999 (174).

The levels of nutritional health risk status were evaluated by the risk scores

of the DETERMINE Checklist. This checklist consists of ten questions with

weighted response scores. The numerical response scores were totaled to reflect a

"risk score" which were associated with nutritional health risk among the

participants. A risk score from 0 to 2 indicated that the elderly participant was at

"low nutritional risk"; 3 to 5 at "moderate nutritional risk"; and 6 or higher at "high

nutritional risk" (8). A modified DETERMINE Checklist was developed from the

standardized DETERMINE Checklist. The questions on asking the inadequacy of

the food consumption and physical incapability each was integrated as one question

in the standardized DETERMINE Checklist. The modified DETERMINE

Checklist has asked each of the integrated question as three separated questions.

Each modified question was calculated with the same weighted risk score as the

original standardized questions from the DETERMINE Checklist. The results from

the modified DETERMINE Checklist also were calculated and summed as a

nutrition risk score (NRS).

Through cross-comparison the standards of the Food Variety Score (FVS)

and the risk scores from the DETERMINE Checklist, the efficacy of the

DETERMINE Checklist the sensitivity and specificity were evaluated among the

Chinese elderly participants. The results from the FVS provided the information on

the adequacy of food consumption among the Chinese elderly. The results from the

DETERMINE Checklist evaluated the nutritional health risk status of the Chinese

elderly. By comparing the two research results, the sensitivity and specificity of the

DETERMINE Checklist were evaluated. Sensitivity and specificity have been used

to measure the accuracy of classification of a tool according to Frankle and Owen in

1993 (72). The sensitivity and specificity can be calculated by the following

formulas:

Sensitivity = TP (100) / (TP+FN)

Specificity = TN (100) / (TN+FP)

Where: TP, True Positive: poorly nourished identified as poorly nourished; FN,

False Negative: poorly nourished but identified as healthy; TN, True Negative: well

nourished identified as such; and FP, False Positive: well nourished but identified

as poorly nourished. The higher the percentages of the calculations were from the

formula, the more sensitive or specific the tools were. One hundred percent is the

perfect score, and 75% was an acceptable score for both sensitivity and specificity.

The nutrition screening tools are usually more specific than sensitive (167).

Body mass index (BMI) was calculated by using weight in kilograms

divided by squared height in meters. Healthy elderly should have a BMI between

24 and 27 (8). The weight of the Chinese elderly participant reported in pounds

was calculated as kilograms by dividing the factor 2.2. Both the weight and height

of elderly participants were collected during the nutrition and health status

interviews, and used as the factors to calculate into BMI.

The results of each question from the Nutrition and Health Related

Questionnaires were coded with a named variable, according to the code book

developed by the researcher (Appendix 9), which described the definitions of the

values for each variable corresponding to each question, using the Statistical

Package for the Social Sciences version 7.5 (SPSS® 7.5) for Windows 98 (176).

Independent variables in the study were demographics, acculturation, attitude and

awareness to nutrition and health, English language competency, Asian food

accessibility, whether the person was receiving government benefits, insurance

coverage, and health status. The frequency of the independent variables as well as

the associations between independent variables and nutritional health risk levels,

and the associations between independent variables and the adequacy of food

intakes were examined. Multiple regression analysis was used to identify which

questions in the DETERMINE Checklist predicted for the adequacy of food intake.

RESULTS AND DISCUSSION

The research question; can standardized nutrition screening tools from the Nutrition Screening Initiative (Appendix 1) be used to identify the nutritional health risk status of the Chinese elderly? In order to address this question, there were three primary purposes of this study: (1) evaluate the nutritional status among Chinese elderly; (2) determine the adequacy of food intake among the Chinese elderly using a nutrition assessment method; and (3) identify sensitivity and specificity of the nutritional health risk screening tool, the DETERMINE Checklist, for the Chinese elderly. This research case study was designed to assess the nutritional health status, adequacy of food intakes, and efficacy of nutrition screening tools to determine the nutritional health status among the Chinese elderly.

Combined qualitative and quantitative research methods were used for this research study. The focus group interview was the qualitative research method where a pilot study and face-to-face interviews were the quantitative research methods. Nutrition assessment and screening tools were suspected to be culturally and/or geographically inadequate to determine the nutritional health status among Asian American elderly (8, 118, 138). Therefore, the focus group interview was used to develop culturally specific nutrition assessment tools that could be used to evaluate the adequacy of food consumption for the Chinese elderly. A pilot study, which followed the focus group interview, was implemented to evaluate the

cultural adequacy of the questions in the Nutrition and Health Related

Questionnaire (Appendix 7) and which was used in the nutrition and health status

interviews of the Chinese elderly.

## Focus Group Interview

### Foods Inventory List

A focus group was selected and the interview was audio-taped to identify

and to generate a culturally specific Chinese food inventory and a nutrition

assessment instrument for evaluating the nutritional health status among Chinese

elderly. A food inventory was established by asking the Chinese elderly focus

group participants what the commonly eaten food items were for breakfast, lunch,

dinner, and snacks. The nutrition assessment instrument of culturally specific

foods was collected and compiled by asking the elderly participants to follow

written instructions on how to take photos of their commonly eaten Chinese foods

in one serving size using two, one-time use cameras (Appendix 6). Focus group

participants were asked to return two one-time use cameras in postage-paid

envelopes within a month of time. A one-page documentation sheet identifying the

food photos that were taken sequentially was returned with the cameras.

**Focus Group Interview**. The Chinese elderly focus group research participants

(n=6) were from Corvallis, Oregon. The participants were selected by using the

purposive and snowball sampling methods (167). Corvallis was chosen as the location for the focus group participant recruitment because it was reported as one of the most culturally diverse cities in Oregon (177). Purposive sampling was used to recruit the hard-to-reach culturally specific research participants, such as Chinese elderly, whereas snowball sampling was used when the research participants were encouraged to invite their friends to participate in the case study research within a cultural community (167). For example, the first Chinese elderly research participant was referred by one of researcher's Chinese friends who often participated in local Chinese community activities, such as the Chinese church services. The following Chinese elderly research participants were identified and referred by the first research participant with whom they regularly participated in the "Chinese bridge" (Ma Jiang) game club.

The recruitment location and identification of the Chinese elderly focus group participants was the key to the success of the cultural research. The participants were located through Chinese friends' referral and contacted via phone communication in a native Chinese languages, Mandarin or Taiwanese. The purposive sampling technique was a successful technique to recruit potential Chinese elderly research participants. One phone contact was made successfully to invite each referred research participant and seek his/her willingness to participate in the research. The phone conversation included the explanation of the focus group research purposes, procedures, and the benefits and risks involved in the research. The conversation included the research purposes, which were to develop

a culturally appropriate nutrition assessment instrument and the research procedures using a focus group to interview about their commonly eaten foods for breakfast, lunch, dinner, and snacks. Benefits of Chinese elderly participating in the focus group research included receiving a copy of the Chinese food photos that they took as the incentive for participation. Risks of participating in the focus group research included personal questions asking about the food they ate. However, research participants were told that they could refuse to answer any question that they did not want to respond to and could discontinue participating in the interview at any time.

Thirty minutes of introductory informal conversation about the researcher's background built the trust between perspective participants and researcher in order to increase the willingness of participation and/or the accuracy of the health related information the participants provided in the research. The communication method was selected as it was successfully used by Sadler et al. (178) who reported an effective initiation of health related conversation in native Asian languages when researchers positioned themselves as part of the members of community with culturally appropriate verbal style and salutations.

Six Chinese elderly focus group participants were successfully recruited from a pool of twelve elderly that were referred from researcher's friends, and the interview time was arranged through a total of three phone contacts. Six Chinese elderly participants, five females and one male, were willing to participate in the focus group interview after the first phone contact. The second phone contact was

made to each participant arranging the interview time and location. Thursday,

August 26, 1999, at 11:00 am prior to lunchtime was chosen by the researcher as

the focus group interview time because the majority (83%) of the elderly

participants planned their social activities in the afternoons, such as meeting with

their friends for a Ma Jiang game or volunteering in the local hospital. The third

phone call, which was made in the evenings or at the nights before the actual

interview day served as the reminder of interview time and location. Location of

the focus group interview was at a local Asian restaurant, which was accessible to

all of the participants. They were invited to have lunch following the focus group

interview. The purpose of the lunch was to encourage the perspective participants

to participate in and complete the focus group interview. This technique was

successful and recommended by Lau et al.'s (117) study, which has reported that

mealtime gatherings served an important social event in Chinese culture for friends

and family to get together.

**Focus group interview process and results.** The age range of the six focus group

research participants was 72 to 80 years old, with an average duration of 31 years

of living in the United States. All research participants, as it turned out, were

college graduates. The education quality was very beneficial as each participant

had some experiences in organizing educational activities. This contributed to the

completion of providing a food inventory list and quantitative nutrition assessment

instrument, the Chinese food photos. The education level paralleled the work of

Whelton et al. (179) which identified that the participants who attended college

were found to be positively associated with the motivation of participating in research and providing health related information.

The informed consent forms were translated to Chinese and validated the content validity prior the pilot study and nutrition and health status interviews. The informed consent form was used to protect the rights of research participants and inform the participant of the research purpose, procedure and the benefits and risks (Appendix 8).

Each participant chose to sign the English version of the informed consent form, which they received in the mail following by the focus group interview. A foods inventory list was established through the audio-taped focus group interview process among the six Chinese elderly participants using a native Chinese Mandarin language prior to a lunch meeting. The language of the focus group interview was conducted in Mandarin by researcher. Mandarin is the most popular native Chinese language which all of the bilingual participants chose to use. The researcher asked each of the participants his/her commonly eaten foods for breakfast, lunch, dinner, and snacks. The Chinese elderly focus group participants (n=6) took turns answering each of the questions. The results of the focus group interview were translated and transcribed from Mandarin to English by the researcher after the focus group interview was completed (Appendix 10). Total interview time was about eighty minutes with a range of one to five minutes per person per question and an average of fifteen minutes per person for answering the questionnaire. The commonly eaten foods identified by the Chinese elderly are

**Table 1**

Commonly eaten food items for breakfast, lunch, dinner, and snacks categorized by meals, food groups, and mixed dishes among Chinese elderly (n=6)

| Meals | Foods | | | | | | |
|-------|-------|-------|------------|------|------|------------------------|---------------|
| | **Grains** | **Fruits** | **Vegetables** | **Meat** | **Milk** | **Added Fat or sugar** | **Mixed dishes** |
| Breakfast | Bread | Juices | | Egg | Milk | Peanut butter | Pre-packaged breakfast meal |
| | Oatmeal | Grapefruit | | Bacon | | | |
| | Read-to-eat cereals | Banana | | Sausage | | | |
| Lunch | Rice | Juices | Lettuce | Chicken | Cheese | Sesame oil | Steamed dumplings |
| | Chou mei noodles | Peach | Cucumber | Fish | | Seafood sauce | Frozen dumplings |
| | White noodles | Apple | Broccoli | Tofu | | Salad dressing | Lean pocket |
| | Pasta | Cantaloup | Bean sprouts | Egg beater | | Oyster sauce | Pre-packaged frozen meals |
| | Ramen noodles | Honeydew | Carrot | Lunch meats | | Peanut butter | Potato salad |
| | | Orange | Chinese Chi | Pork | | | |
| | | Banana | Napa Cabbage | Turkey | | | |
| | | | Little Chinese white cabbage (Xiou Bie Ci) | Imitation crab | | | |
| | | | Tomato | | | | |
| | | | Tomato sauce | | | | |
| | | | Green beans | | | | |
| | | | Potato | | | | |
| | | | Green pepper | | | | |

**Table 1 (Continued)**

Commonly eaten food items for breakfast, lunch, dinner, and snacks categorized by meals, food groups, and mixed dishes among Chinese elderly (n=6)

| Meals | Foods | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Grains** | **Fruits** | **Vegetables** | **Meat** | **Dairy** | **Added Fat or sugar** | **Mixed dishes** |
| Dinner | Bread | Apple | Pea | Chicken | Cheese | Sesame oil | Pre-packaged frozen meals |
| | Oatmeal | Orange | Cabbage | Tofu | Milk | Peanuts | Frozen dumplings |
| | Ramen noodles | Banana | Green beans | Fish | | Lobster chips | |
| | Rice | Juices | Broccoli | Chinese sausage | | Ice cream | |
| | White noodles | | Carrot | Dried shrimp | | | |
| | | | Cucumber | Pork | | | |
| | | | Garlic | | | | |
| | | | Hot pepper | | | | |
| | | | Dry mushrooms | | | | |
| | | | Cauliflower | | | | |
| | | | Chinese dried vegetables (Mai Gan Ci) | | | | |
| Snack | Cake | | Sweet potato | Soybean | | Potato chips | |
| | Pie | Dried fruits | | | | Cookies | |
| | Cracker | | | | | Sesame seeds chips | |
| | | | | | | Candy | |
| | | | | | | Peanuts | |

listed in Table 1 on page 89 and categorized by meals and food groups according to the U.S. Food Guide Pyramid. All research participants stayed for lunch followed by the focus group interview.

A written instruction packet (Appendix 6) included the instructions for taking food photos, one-serving size explanation sheet for each food group, a figure on how to take food photos, and a documentation sheet for recording the pictures taken sequentially with two 27-exposure one-time use cameras (labeled as camera one and camera two). The packets were given to the focus group research participants at the end of the focus group interview. According to the instruction sheet, the researcher explained the procedure of separating each uncooked food ingredient into one serving size according to the definition of the quantities for each food item from the food groups in the U.S. Food Guide Pyramid (108). Two 27-exposure one-time use cameras were adequate to provide film to take pictures of Asian food items. A previous study by Hankin et al. (120) suggested, there would be approximately 48 food items eaten per day among the Asian population. An explanation sheet identifying one-serving size written in both Chinese and English for food items from each food group was included in the instruction package (Appendix 6). The participants were asked to record sequentially the name of food items of which they had taken the pictures.

The results of food photos using the two one-time use cameras and the pictures documentation were asked to be returned within a month via postage paid envelopes that were provided to the focus group research participants. The

participants were also encouraged to call the researcher at anytime if they had questions on the research procedures. The researcher received only one phone call asking the question about determining the food group for a homemade steamed dumpling, which was actually a mixed menu dish of grain, meat, and vegetable group. Follow-up letters and postage-paid envelopes were sent out at intervals, starting about four to eight days, ten days, and three weeks to serve as a reminder to return cameras following by the focus group interview.

**Dietary habits.** Traditional Chinese dietary habits, types of foods consumed and food preparation methods, were reported among the Chinese elderly focus group participants (n=6) in a audio-taped focus group interview. The results were transcribed by the researcher (Appendix 10). Vegetables were reported and to be consumed in the most variety (36%) compared to meat (24%), grains (19%), fruits (18%), and milk products (3%). Twenty-one different kinds of vegetables were reported and consumed among the Chinese elderly participants compared to fourteen for the meats, eleven for grains, ten for fruits, and two for dairy products.

A combination of traditional and U.S. dietary habits was reported and practiced among the Chinese focus group participants. Vegetables that were consumed including Chinese vegetables, which were available only in Asian food stores, such as little Chinese white cabbage (Xiou Bie Ci), Chinese Chi (Giou Ci), and Chinese dry vegetables (Min Gan Ci). Other vegetables, such as lettuce, cucumber, broccoli, carrot, tomato, etc., were available in U.S. food stores. Consuming various vegetables both at lunch and dinner mealtimes was the most

common traditional Chinese dietary habit practiced among all elderly participants. The outcomes were similar to the report done by Tong's Asian American elderly study (42). In the grains food group, rice and noodles were reported to be consumed both at lunch and dinner mealtimes. Commercially packaged instant noodles, such as Ramen noodles and white noodles, were reported to be consumed at both lunch and dinner. The most commonly consumed meat was chicken (four out of six participants reported=67%) among the Chinese elderly participants, followed by fish (three out of six participants reported =50%) and pork (three out of six participants reported=50%). Egg was also frequently consumed for breakfast (17%) and lunch (17%), and tofu was reported consumed at lunch (17%) and dinner (17%). In the mixed menu dish, the frozen dumplings included meat, vegetable and grains, either steamed dumplings or fried as pot stickers, were popular as a choice as a convenience Chinese food item and reported consumed both at lunch and dinner.

Food preparation methods were maintained in traditional Chinese ways. The majority of the vegetables were prepared as "cooked" either in soups or stir-fried (87%). Salad (13%) was reported as one of the popular raw vegetable dishes, which is not a traditional Chinese dietary habit, and sesame seed oil was used as the salad dressing. Seventeen percent of the participants reported using dried shrimp as a flavor enhancer instead as a main meat group. Other traditional Chinese cooking condiments, such as oyster sauce, were also used as the stir-fried flavoring sauce in the food preparation process.

Non-traditional Chinese dietary habits of consuming American convenience foods and using liquid or pill forms of nutrition supplements were practiced by eighty-three percent of the Chinese elderly focus group participants. Convenience pre-cooked frozen foods and ready-to-eat food items, such as fried chicken, purchased from the deli-department in grocery stores, were consumed among the Chinese research participants. The pre-cooked frozen foods were reported as the pre-packaged breakfast meals in the boxes, which are often called "TV dinners." Those frozen foods were consumed after they were heated by microwave ovens. Elderly focus group participants reported that pre-cooked foods were "inexpensive" and they did not need to go through the trouble of cooking. The ready-to-eat foods, such as fried chicken, roasted chicken, and potato salad, purchased from the Deli-departments in the grocery stores were also consumed because of convenience and they were considered to be "inexpensive". These foods did not reflect a traditional Chinese dietary habit. One or more nutrition supplements, including either liquid, such as nutrient-dense liquid supplements, or pill forms, such as multivitamins, were reported and taken by all females (n=5) but not by the male (n=1) focus group participants. This was similar to Houston et al.'s report (180) that female and elderly were more likely to take nutritional supplements than male counterparts.

An unique measuring unit, "bowls", to quantify the amount of foods eaten was used among all Chinese elderly focus group participants. "Bowls" were used as the food serving and measuring units to describe the amount "bowls" of grain products that they had eaten, such as "a bowl of rice", instead of number of cups of

food items. This measuring unit was used because of the traditional Asian containers of foods, such as rice and noodles. The common size of a bowl used for cooked rice or cooked noodles was equal to 12 oz (one and a half cups). The researcher made an adjustment of the measuring amounts between the Chinese food-serving units as "bowls" and the U.S. food-serving units as "cups."

The food inventory list (Table 1) and the nutrition assessment instrument, the Chinese food photos (Appendix 12), were quantitative culturally sensitive nutrition assessment tools and served as the visual aids as part of the following pilot study and nutrition and health status interviews. These methods were used to decrease the memory errors of recalling food items that were eaten the previous day by the elderly, which was also a method used by Lee et al. (118).

Chinese Food Photos

The results of the Chinese food photos taken by the Chinese elderly focus group participants were unsuccessful. The return rate, 84%, of one-time use cameras was successful. However, among the 84% returned cameras, the professional film developers could not develop half of the returned cameras film because of under-exposure. Among the other half which could be developed, the brightness, clarity, and distance of the foods on the photos made them unsuitable to be used as visual aids because of the poor quality (Appendix 11). The food items were either fuzzy, with busy backgrounds, shadow on the food item, or the selected

food items were not quantified in one serving sizes. This prevented the use of those food photos as a quantitative nutrition assessment tool for the planned research. This methodology of asking Chinese elderly to take food photos was not successful.

An alternative method of gaining Chinese food photos to provide nutrition assessment instrument was adapted. The combination of a professional Chinese food photos and food models were used as the alternative nutrition assessment instruments. A volunteer professional photographer worked with researcher and took the Asian specific food photos in one serving size (Appendix 12). American food models consisted of 185 commonly eaten foods, which were used as visual aids in implementing the nutritional assessment process. The food models were in actual portion sizes of one-serving, and represented the commonly consumed foods in the United States which were obtained from the Oregon Dairy Council (182).

The Nutrition and Health Related Questionnaire (Appendix 7) included integrated questions of a 24-hour dietary recall, the modified DETERMINE Checklist from the standardized DETERMINE Checklist and the Level I Screen, demographic factors, acculturation factors, and attitude factors. Additionally, English language communication ability, awareness of nutrition, cultural food accessibility, health status, and receiving government assistant or insurance were included in the questionnaire. The questionnaire was first developed in English, and then translated in Chinese by a native Chinese speaker. Another native Chinese speaker would back translate the Chinese version of the questionnaire into

English to ensure the translation of the words was accurate. This cross-culture translation validation procedure was adapted from the study done by Sperber et al. (185). The content validity was implemented by comparing the original English version and the translated English version of the informed consent form and the Nutrition and Health Related Questionnaires.

**Pilot Study.** A total of five Chinese elderly, four females and one male, were interviewed face-to-face. Five similar demographic characteristics of pilot study participants were interviewed in a native Chinese language using the native Chinese language informed consent form and questionnaire. Demographic characteristics of the Chinese elderly pilot study participants were that they had nine years of education background, they lived in the city or urban areas, and have been in the United States for more than ten years. All of the elderly participants chose to sign the Chinese version of informed consented form (Appendix 8), and to be interviewed in the native Chinese Mandarin language using the Chinese version of Nutrition and Health Related Questionnaire (Appendix 7).

The purpose of pilot study was to examine the readability of the research questionnaire, the Nutrition and Health Related Questionnaire (Appendix 7), and for researcher to experience the actual interview time and the flow of interview process. The evaluation of the interview process was to focus on the length of interview time, the readability and acceptability of the Nutrition and Health Related Questionnaire, and the accessibility of health status information of the elderly participants. Each participant had a choice of using either the Chinese or the

English versions of the study forms and the Nutrition and Health Related

Questionnaire.

Referral and recruitment methods were successful contacting the

perspective pilot study participants, which provided important feedback for the

research. Referral from the president of the Chinese Community Association, the

coordinator of the Elderly Nutrition Program at Asian site, and Chinese religious

leaders were the important keys to recruit potential Chinese elderly pilot study

participants successfully. Initial contacts were made from the researcher to the key

leaders located in the thirty miles radius from the Oregon cities of Portland,

Beaverton, Salem, Corvallis, and Eugene. The religious leaders informed the

potential Chinese elderly about the research and encouraged of participation. A

personal follow-up invitation to participate in the research was delivered either

face-to-face during the mealtime, church services, or two to three personal phone

calls. The first phone contact with the participant was made by the researcher in

native Chinese Mandarin language to explain the research purposes, procedure, and

potential benefits and risks of participating in the research. The research purpose

was to examine the Chinese elderly nutritional health related risk factors and the

research procedure included the face-to-face interview using the Nutrition and

Health Related Questionnaire. Informal feedback of seeking the acceptance of

participation in the research among the perspective participants was that all of the

perspective participants (n=5) wanted to know who had referred them to the

research prior to they committed to participate. All of the pilot study participants

chose to be interviewed at their own homes with the usage of the Chinese Mandarin language.

The Nutrition and Health Related Questionnaire was adapted without adjusting the questions from the evaluation of the pilot study research results. The length of the interview was appropriate. However, five traditional Chinese herbal food supplements eaten in the previous 24-hours were not able to be identified using the visual aids, and some questions in the Nutrition and Health Related Questionnaire were somewhat confusing to the Chinese elderly participants. The length of the interview time averaged 32 minutes, ranging from 28 to 35 minutes, which was appropriate as the similar results reported by Lee et al. (118) suggested that a maximum of thirty minutes face-to-face interview time was appropriate for the face-to-face interview study of elderly participants. A majority of the food items that were eaten in the previous 24 hours could be identified from the visual aids, the food inventory list and the Chinese food photos, combined with the commonly eaten American food models, with some exceptions. An example of the exception was the traditional Chinese herbal food supplements which were cooked with food items, such as "Go Gi", "Dong guang", "Ci Wu", "Tan Nine", and "Gingsen", were not on the list of Asian food inventory, the commonly eaten Chinese food photos, or the commonly eaten American food models. Those traditional Chinese herbal medicines were not considered as the "commonly eaten food items". Instead they were more likely to be categorized as the "complementary food supplements" (184).

Questions which were directly translated from the DETERMINE Checklist and Level I Screen were confusing to participants when the questions were asked in "double negative way", such as "have not", and the choice of answer was "never". One example of one of the questions was "Do you have not enough food to eat each day?" and if the participant's answer is "No, I <u>always</u> have enough food to eat each day", which the participant actual meant "No, I <u>never</u> have <u>not</u> enough food to eat each day", and the choice of answer should be "never" instead of "always". However, all of the Chinese elderly participants were able to understand the actual meaning of questions with the researcher's verbal explanations without modifying the original questions adopted from the standardized DETERMINE Checklist and Level I Screen. Therefore, the Nutrition and Health Related Questionnaire was used without adjusting the questions in the questionnaire, but with verbal explanations when there was needed.

Self-reported body weight was a better access to weight measurements than using the weight scale. The most common measurement method of vital characteristics among the pilot study Chinese elderly participants was the self-reported weights. Accurate body weight could not be obtained from all of the Chinese female elderly participants. Forty percent of participants provided verbal body weight and sixty percent of the participants refused to be weighed. Therefore, participants' weights were self-reported measurements if they refused to be weighted. Self–reported weight and height have been reported as highly correlated with the actual body weight even when the body weight was often underestimated

according to Chor et al (183). The combination of self-reported body weight and height measurements used to calculate the Body Mass Index (BMI) provided only approximate accuracy but not precision.

In summary, the revised interview process for the nutrition and health status interviews was implemented followed by the research results from the focus group interview and the pilot study. The Nutrition and Health Related Questionnaire could be used to evaluate the adequacy of food consumption and nutritional health risk status accompanied by the food inventory list. Chinese food photos, and commonly eaten American food models were implemented in assessing the adequacy of food consumption during the 24-hours dietary recall. Questions in the Nutrition and Health Related Questionnaire were not modified because these were adopted from the screening tools of the Nutrition Screening Initiative with permission and with the verbal explanation from the researcher, the participants were able to understand the meanings. Self-reported weight and height were chosen to be the methods of obtaining these measurements. Questionnaires and informed consent forms that were validated in both Chinese and English would be available for research participants to choose. The food inventory developed from the focus group interview, and the common eaten Chinese food photos and American food models were used to assess the food consumption. The measuring unit for foods was calculated from "bowls" to "cups" (one bowl = one and a half cups). Additional introductory time for presentation of the researcher's background

was also planned in each of the interviews prior to the appointment with each interview participant.

## Nutrition and Health Status Interviews

The purposes of Chinese elderly nutrition and health status interviews were to determine the nutritional health status and the efficacy of using a standardized nutrition screening tool, the DETERMINE Checklist. The research participants were the Chinese elderly age 70 or above (n=60) living in houses or apartments. The Nutrition and Health Related Questionnaire was used to interview and evaluate the adequacy of food intakes and nutritional health risk status among the Chinese elderly participants using a face-to-face interview method. This questionnaire was written and available in both Chinese and English for research participants to choose prior to the interviews. The nutrition and health status interviews research was completed and fifty-eight Chinese elderly participants were interviewed using the Nutrition and Health Related Questionnaire in six months, including three months of participants recruitment time, two months of data collection, and one month of data analyses.

**Research participant recruitment.** The research participants were referred from the Chinese church leaders, Chinese Service Center director, and advertisement in a local Chinese newspaper. These sources were the most successful in research recruitment of the Chinese elderly participants compared to other resources, such as

from the referral of the coordinator of Elderly Nutrition Program at the Asian site, or the posters at Asian or non-Asian restaurants. Invitation letters explaining research purposes, procedure, benefits, and risks for Chinese elderly participating in the research were sent out to various community locations. The Chinese elderly participants were most likely to be recruited from the referrals of the Chinese church leaders (52%), director of the Chinese Service Center (26%), and other resources (22%), such as referral from the coordinator of Elderly Nutrition Program at the Asian site. Twenty-six percent of the Chinese elderly participants were recruited from the Chinese Service Center who had actually seen the advertisement in the local Chinese newspaper. The most successful recruitment of the Chinese elderly participants was followed by the referrals from the director of the Chinese Service Center who had relayed the sense of trust to the researcher, which was also reported in Mukai's (186) study. Other resources included the referrals from the coordinator of Elderly Nutrition Program at the Asian site, which provided twenty-two percent of the research participants. There were no Chinese elderly research participants referred from the Office of Minority Health, randomly selected Asian grocery stores, and Asian and non-Asian restaurants.

Legal residency status and sense of self-care were two important factors affecting the participation of Chinese elderly in the research. Legal residency status was the first main concern in order for the Chinese elderly to participate in the research. An example of the question the researcher received from several perspective participants prior to their consent of participating in the research was

"Would you think if I participate in your research it would affect my immigration status staying in the United States?" Additionally, the Chinese elderly were more likely to avoid bothering to someone instead of seeking health care. For example, some potential participants had asked the researcher, "Is this too much bother for you to do this? I don't really want to bother you." Sense of self-care was embedded in the Chinese elderly traditional perspectives, which was also reflected in the 1999 research results of Mukai (186).

**Descriptive research results.** Demographic characters of the Chinese elderly research participants (n=58) including age, gender, education, and types of the community in which they live are listed in Table 2. Geographical recruitment areas included thirty-miles radius from the Oregon cities of Portland, Beaverton, Salem, Corvallis, and Eugene, which were the cities with the highest percentage of the Chinese population according to the Oregon population projections (150). A total of fifty-eight Chinese elderly aged 70 or older, representing a ninety-seven percent of the recruitment rate, were interviewed face-to-face. Seventy-four percent of the participants were old-olds who were ages between 70-79 compared to the oldest-olds, who were age 80 or above (26%). Gender of the research participants were almost equally distributed, about half of them were male elderly participants (47%) and half were female elderly participants (53%). Education backgrounds of the participants were distributed unequally at each level. The highest percentage of the elderly participants was college graduates (20%) and the second highest percentage of the elderly participants was high school graduates (19%). About half (44%) of

the Chinese elderly participants at least had some college education, and the half

(56%) of the Chinese elderly participants was at the maximum high school

graduates.  Geographical living locations of the Chinese elderly participants were

more concentrated in the city areas.  Over half of the elderly participants were

living in the city (59%), rather than urban (32%) and rural areas (9%), which was

similar to the study reported by Gelfand (20) stating that Asian American elderly

were more likely to live in the cities than in the rural areas.  The data collection

(two months) and analyses (one month) process of the nutrition and health status

interviews were completed in three months.

**Table 2**
Demographic characteristics of Chinese elderly
participants in nutrition and health status interviews
(n=58)

| Demographic characteristics | Participants | |
|---|---|---|
| | # | % |
| Age | | |
|   70-79 | 43 | 74 |
|   80 + | 15 | 26 |
| Gender | | |
|   Male | 27 | 47 |
|   Female | 31 | 53 |
| Education | | |
|   0-4 years | 4 | 7 |
|   5-8 years | 10 | 17 |
|   Some high school | 7 | 12 |
|   High school graduate | 11 | 19 |
|   Some college | 7 | 12 |
|   College graduate | 12 | 20 |
|   Graduate school | 7 | 12 |
| Type of community | | |
|   City | 34 | 59 |
|   Rural | 5 | 9 |
|   Urban | 19 | 32 |

Acculturation characteristics including the length of time living the U. S.

and the generations of the Chinese elderly participants are listed in Table 3. Most

of the participants have been living in the United States for more than 10 years

(71%) and are the first generations of the Chinese (83%) living in the U.S. Except

the seventeen percent of the Chinese elderly participants who were born in the U.S.

and were second generation or above, all others were all immigrants. The first

generation of the Chinese elderly immigrants either were the first generation first

came to the U.S. and established the family in the United States in the early 1980's

or they were brought by their younger relatives. According to the early 1980's

immigration record, there were thirty-seven percent of the Chinese population who

had immigrated to the United States before 1950 (187). The Chinese population

who had immigrated at 1950's would be at ages 70's and 80's currently.

**Table 3**
Acculturation characteristics of Chinese elderly
participants (n=58)

| Acculturation characteristics | Participants | |
|---|---|---|
| | # | % |
| Length in the U.S. | | |
| 0-6 months | 1 | 2 |
| 7-12 months | 0 | 0 |
| 1-3 years | 3 | 5 |
| 3-6 years | 6 | 10 |
| 6-10 years | 2 | 3 |
| 10 years or more | 41 | 71 |
| Life time | 5 | 9 |
| Generation | | |
| First | 48 | 83 |
| Second | 6 | 11 |
| Third | 2 | 3 |
| More than third | 2 | 3 |

Language competency of the Chinese elderly participants is listed in Table

4. This was determined by two questions from the questionnaire: (1) if the

participants require a translator to complete the interview in English, and (2) if the

participants speak or read English when they do their grocery shopping. Fifty-five

percent of the participants required translators' assistance, compared to forty-five

percent did not need to have translator's assistance if the interview was conducted

in English.

**Table 4**

Language competency of the Chinese elderly participants (n=58)

| Language competency | Participants | |
|---|---|---|
| | # | % |
| Require translator | | |
| Yes | 32 | 55 |
| No | 26 | 45 |
| Read or speak English when they do grocery shopping | | |
| Always | 24 | 41 |
| Sometimes | 13 | 23 |
| Never | 21 | 36 |

However, only forty-one percent of participants were always able to speak

or read English when they did the grocery shopping, compared to the thirty-six

percent who would never be able to, and twenty-three percent who were sometimes

able to speak or read English under the same situations. Informal comments were

provided from one female research participant age 72 years old who has been living

in the U.S. for seventeen years regards to English language competency. This participant was brought to the U.S. by her daughter, needed translators if the interview was conducted in English, and did not speak or read English when she did the grocery shopping. She made the comments were:

> "I don't really need to know English when I do the shopping. Prices are all labeled on the food containers, as long as I know the numbers, and pay the prices they want when I check out. I don't really need to know about the English. Most of the foods I buy, I can tell from the pictures on the labels or see the foods inside the jars. I don't have to ask about what are the foods. I can guess most of the foods either from the labels, or my friends have already shown me the containers and labels, I can find the same ones in the store, so I don't have to ask around."

This coping method was developed by the Chinese elderly to overcome the English language barriers while they were living in this country. Language barrier did not prevent them from shopping for foods and performing one of the instrumental activities of daily living (IADL), such as reading or speaking the foreign language when they were shopping for foods.

The attitudes towards nutrition and health among the Chinese elderly participants, including the questions of self-rated health status and perceived importance of nutrition as it related to health are listed in Table 5. Seven and forty-eight percent of the participants perceived their own health status as "excellent" and "very good" condition, and followed by "fair" (36%) and "poor" (9%), which were similar to the research results of Frank et al. presented in 1995 and Moller et al. in 1998 that elderly people generally perceived their own health status positively (188, 189). A total of eighty-seven percent of the Chinese elderly participants

thought that the nutrition was a "very important" (40%) or "important" (47%)

factor related to their health. Only twelve percent of the participants thought

nutrition was "not important at all" to health. According to one male Chinese

elderly pastor participant age 74 years old:

> "I don't think the nutrition is that important without the spiritual
> needs for health. The spiritual of the human body needs more
> nurture than the physical nutrition needs. The nutrition is important,
> but not too important without the spiritual to the human body."

**Table 5**
Attitudes and awareness of nutrition and health among
the Chinese elderly participants (n=58)

| Attitudes and awareness | Participants | |
|---|---|---|
| | #. | % |
| Self-rated health | | |
|   Excellent | 4 | 7 |
|   Very good | 28 | 48 |
|   Fair | 21 | 36 |
|   Poor | 5 | 9 |
| Importance of nutrition | | |
|   Very important | 23 | 40 |
|   Important | 27 | 47 |
|   Not too important | 7 | 12 |
|   Not important at all | 0 | 0 |
|   Don't know | 1 | 1 |
| Taking nutritional supplements | | |
|   Always | 39 | 67 |
|   Sometimes | 7 | 12 |
|   Never | 12 | 21 |
| Want to know the research result | | |
|   Yes | 41 | 71 |
|   No | 17 | 29 |

This participant had discussed his response with other elderly participants who were in the same church services prior to the interviews. Overall, the Chinese elderly participants reported a positive attitude toward nutrition related to health which was an addition to Howard et al.'s study results that the overall total elderly population had reported a positive attitude toward nutrition (190).

The awareness of nutrition of the Chinese elderly participants was determined whether they took nutritional supplements or not, and the desire to know the research results or not (Table 5). Sixty-seven percent of the participants were taking the nutritional supplements every day at the time of interview (the answer of "always"). Twelve percent were taking the nutritional supplements when they remembered as reported as "sometimes." This research results showed that taking nutrition supplements was also a common practice among the Chinese elderly population living in Northwest region of the United States. Similar results were reported in the sixty Asian elderly in Tong's study (42). There were thirty-one percent reported taking nutritional supplements regularly. Accessing nutrition information was also a factor of nutrition awareness and seventy-one percent of the participants were interested in knowing the research results. These research results indicated that Chinese elderly participants were aware of nutrition information.

Types of nutrition related diseases of the Chinese elderly participants that they had been diagnosed by the doctors or nurses are listed in Table 6. Fifty-seven percent of the participants reported that they had been told by the doctors or nurses that they have some type of diseases. The highest incidences of nutrition-related

diseases were some type of cancers (43%), followed by high blood pressure (20%)

and heart diseases (15%).

**Table 6**
Diagnosis and types of nutrition related diseases they have among
the Chinese elderly participants (n=58)

| Diagnosis and diseases | Participants | |
|---|---|---|
| | # | % |
| Have doctor or nurses told them that they have disease or not | | |
| Yes | 33 | 57 |
| No | 25 | 43 |
| Types of nutrition related diseases that they have been told[1] | | |
| Cancers | 26 | 43 |
| Diabetes | 7 | 11 |
| Heart diseases | 9 | 15 |
| High blood pressure | 12 | 20 |
| Others[2] | 7 | 11 |

[1] A total of 61 kinds of the nutrition related diseases reported, which is not calculated by the total numbers of participants (n=58). For example, some participants reported more than one nutritional related diseases.
[2] Others included all other diseases that research participants have reported, such as gout, muscle weakness, irregular heart rhythm, etc., were not under the categories of cancers, diabetes, heart disease, or high blood pressure.

These research results of the nutrition related diseases status showed a

similar correlation to the Multicultural Health Mortality Patterns Report from the

Oregon Health Division of the Center for Health Statistics in 1997(28). In the

report which identified the first and second major causes of death among Chinese

were some type of cancers and heart disease with diabetes and high blood pressure

as the fifth and the tenth (28). High blood pressure could become more of a

priority of concern among the Chinese population because of high sodium content

in the traditional Chinese diet (117). Therefore, the health threat caused by high

blood pressure would probably need special attention among the Chinese

population.

**Table 7**

Accessibility to Asian foods in the United States
among the Chinese elderly participants (n=58)

| Accessibility | Participants | |
|---|---|---|
| | # | % |
| Eat Asian foods in the US | | |
| Always | 43 | 74 |
| Sometimes | 14 | 24 |
| Never | 1 | 2 |

Accessibility to Asian foods was determined by asking the Chinese elderly

participants if they consumed Asian foods in the U.S. The results are summarized

in Table 7. Seventy-four percent of participants reported that they "always" ate

Asian Foods in the U.S. and twenty-four percent of them reported "sometimes".

Consuming Asian foods was widely practiced and maintained in the Chinese

elderly participants with the majority (71%) of them living in the United States for

more than ten years. This research result was consistent with the research results in

Tong's study (42), in which it was reported that Asian elderly still maintained the

traditional Asian dietary habits after living in the United States for more than

twenty years.

The types of government benefits that the Chinese elderly participants

received are listed in the Table 8. The participants were more likely to receive the

benefits of Social Security Insurance and Medicare than Oregon Trail Card

Program (the Food Stamp Program), Medicaid, or Senior Nutrition Program.

Sixty-seven percent and sixty-four percent of participants were the beneficiaries of

Medicare and Social Security Insurance compared to nineteen percent for Oregon

Trail Card Program, twelve percent for Senior Nutrition Program, and zero percent

for Medicaid. The Chinese elderly were more likely to receive the benefit of

Medicare as compared to the Medicaid which was similar to the research results

from Pan et al in 1999, in which it was reported that there were only five percent of

Asian elderly Medicare recipients compared to two percent of Medicaid counter

parts (191).

Seventy-one percent of the Chinese elderly participants age 70 or older who

have lived in the United States for more than ten years (Table 2 on page 105).

They were very likely to be permanent residents or U.S. citizens, which was one of

the criteria to receive Medicare benefits and Senior Nutrition Program. There were

some research participants confusing about the differences between "Medicare"

and "health care insurance". Some of the research participants were the recipients

of Senior Nutrition Program, however, had chosen the answer "no" for "did not

participate in the program" during the interview. The coordinator of Senior

Nutrition Program at an Asian Site implied that the Chinese elderly participants

were not familiar with the terminology of "Senior Nutrition Program" but instead

knew it as "a place to receive healthy and nutritious free hot lunches." The

confusion of the terminology among the Chinese elderly could definitely affect the

data accuracy of the numbers of participants reporting in the "Medicare" and

"Senior Nutrition Program". Participants not reporting or not participating on a

regular basis in the Elderly Nutrition Program could affect the beneficial effects of

improving their nutritional health status. Admitting the acceptance of assistance

was a "losing face" action or a "life stressor" from their friends, which was against

the Chinese cultural norm (192, 196). This can affect the data accuracy of numbers

of the Chinese elderly participants participating in the government benefits

programs.

**Table 8**

Receiving government benefit programs among the Chinese elderly
participants (n=58)

| Receiving government benefit programs | Participants | | | |
|---|---|---|---|---|
| | Yes | | No | |
| | # | % | # | % |
| Oregon Trail Card Program | 11 | 19 | 47 | 81 |
| Senior Nutrition Program | 7 | 12 | 51 | 88 |
| Social Security Insurance | 37 | 64 | 21 | 36 |
| Medicaid | 0 | 0 | 58 | 100 |
| Medicare | 39 | 67 | 19 | 33 |

Health insurance coverage and income status of the Chinese elderly

participants are listed in the Table 9. Ninety-one percent of the participants had

additional health care coverage, and fifty-five percent of them reported that they

had an income less than $6,000 dollars a year (which was $1500 less than the

poverty level for one person age 65 or older in 1996) (13). Having health insurance

coverage was not associated with economic factors, which was opposite to the

research results from Takeuchi et al in 1998 of the Chinese American living in the

Los Angeles counties (193). In addition, in Takeuchi et al's study, there were only

sixty-one percent of participants who had health insurance coverage (193).

Informal comments on having additional health insurance coverage from the one

female participant, age 76 were:

> "Health care costs in the U.S. are so expensive. If I don't have
> additional insurance other than Medicaid, I cannot buy some of the
> medicines that I need and I cannot see the doctors in the future. I
> don't have any income after my retirement. My daughter and son-
> in-law have signed me up in their health care coverage. I am very
> glad that I have good daughter, she takes care of me."

**Table 9**

Variables of health insurance coverage and income status
among the Chinese elderly participants (n=58)

| Variables | Participants | | | |
|---|---|---|---|---|
| | **Yes** | | **No** | |
| | **#** | **%** | **#** | **%** |
| Health insurance[1] | 55 | 91 | 5 | 8 |
| Income < 6000/year | 32 | 55 | 26 | 45 |

[1]Have additional health insurance coverage other than Medicare or
Medicaid.

The low-income status did not prevent the Chinese elderly from having the

additional health insurance coverage. Good intergenerational relationships between

the older and younger family members increased the possibility of the older

generation "being taking care of" by the younger generation.

**Table 10**

Average number of servings from each food group
eaten by the male and female Chinese elderly
participants (n=58)

| Number of servings | Mean* | SD** |
|---|---|---|
| Male (n=27) | | |
|     Added fats and sugars | 5.6 | 5.9 |
|     Meat | 3.8 | 2.1 |
|     Milk | 1.1 | 0.8 |
|     Vegetables | 5.4 | 3.8 |
|     Fruits | 2.6 | 1.9 |
|     Grains | 7.9 | 2.9 |
| Female (n=31) | | |
|     Added fats and sugars | 10.2 | 3.7 |
|     Meat | 3.9 | 2.7 |
|     Milk | 0.9 | 0.7 |
|     Vegetables | 4.6 | 2.5 |
|     Fruits | 2.3 | 1.7 |
|     Grains | 8.8 | 7.2 |

\* Numbers are indicated in number of servings.
\*\* SD = standard deviation.

**Food consumption and dietary habits.** The average numbers of servings from

each food group eaten by the male and female Chinese elderly participants are

listed in Table 10. The daily recommended number of servings for each food group

from the U.S Food Guide Pyramid was using the lower end of each range 6

servings of grains, 3 servings of vegetables, 2 servings of fruits, 2 servings of meat

and 3 servings of milk products. The average consumption of milk products was the only food group in which both male and female Chinese elderly did not meet the recommendation from the U.S. Food Guide Pyramid. Dairy products have not been included in the traditional diet for Chinese (117).

High average intakes of added fats and sugars were also reported from the female (n=31) (average 10.2 servings a day) and male (n=27) (average 5.6 servings a day) among the Chinese elderly participants who had been living in the U.S. for more than ten years. These research results were similar to Yang's study, which reported the Chinese immigrants had increased the total fat consumption after living in the U.S. for more than ten years (39).

The daily food consumption of the Chinese elderly participants (n=58) were reported as the number of servings that were eaten from each food group according to the U.S. Food Guide Pyramid which are noted and categorized in Figure 1. At the 50$^{th}$ percentile level of intakes (the midpoint bar of the boxplots), fifty percent of the participants met the minimum recommendations in their consumption of fruits, grains, meat, and vegetables from the U.S. Food Guide Pyramid. All of the participants did not meet the recommendations for consumption of milk products. Therefore, the Chinese elderly were most likely to have inadequate intakes of the milk products.

The daily food consumptions of the male and female Chinese elderly participants are listed in Figure 2 and Figure 3. The male and female elderly

# Chinese Elderly Participants Food Consumption
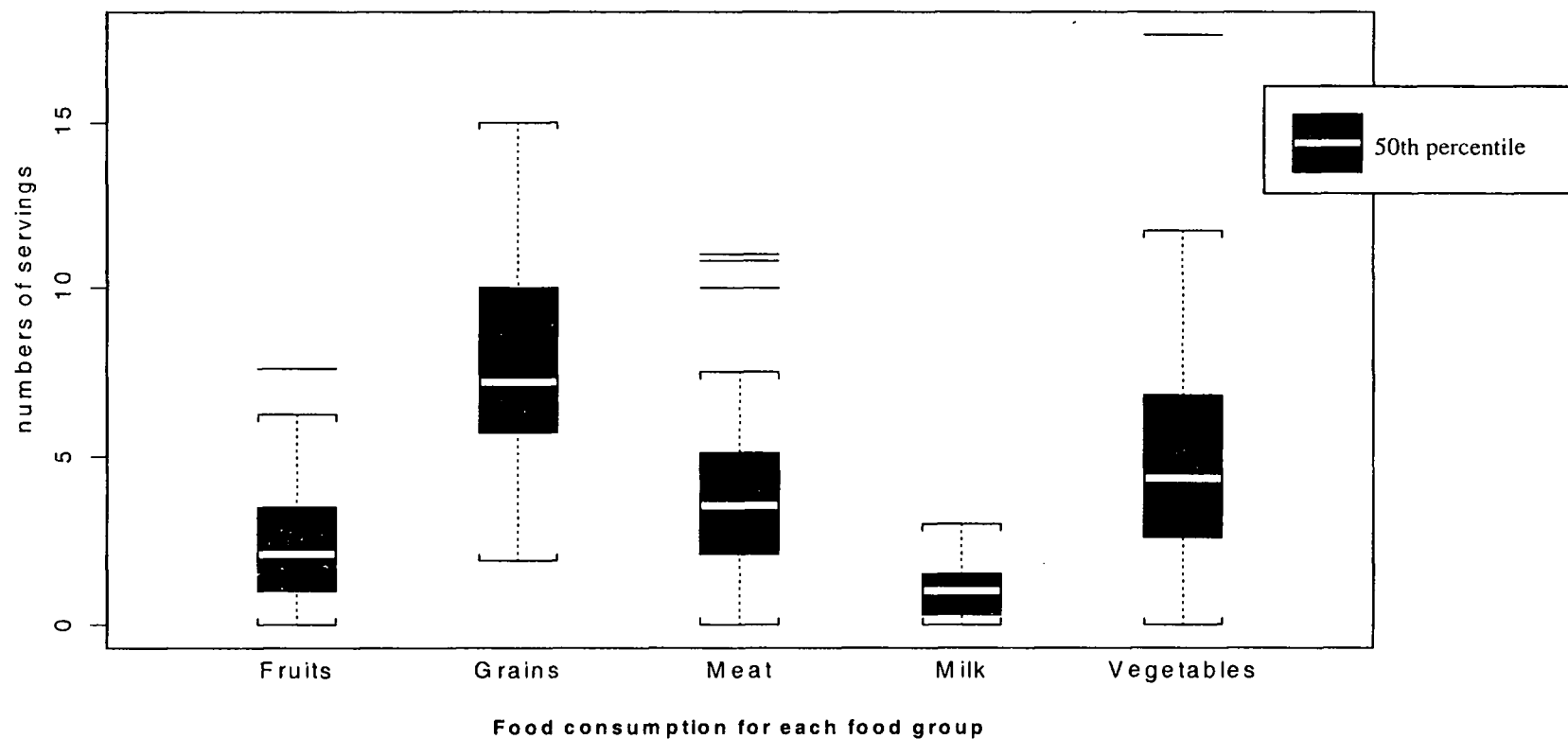


Figure 1. Food consumption among the Chinese elderly participants (n=58) for each food group.
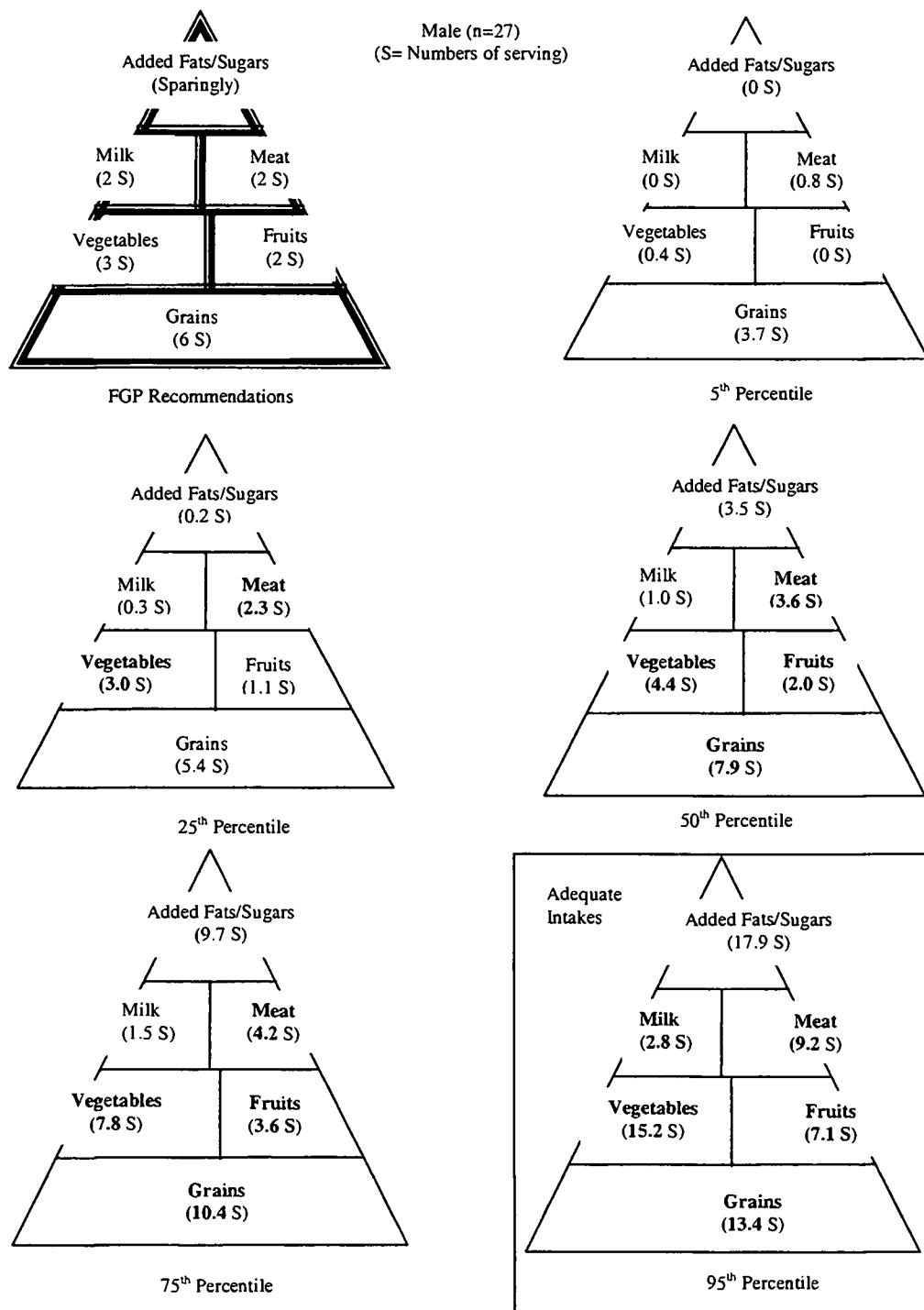
Figure 2. Number of servings (S) of foods from each food group compared to the recommendations from the U.S. Food Guide Pyramid (FGP) among the Chinese elderly male participants (n=27) at the intake levels of 5th, 25th, 50th, 75th, and 95th percentiles.
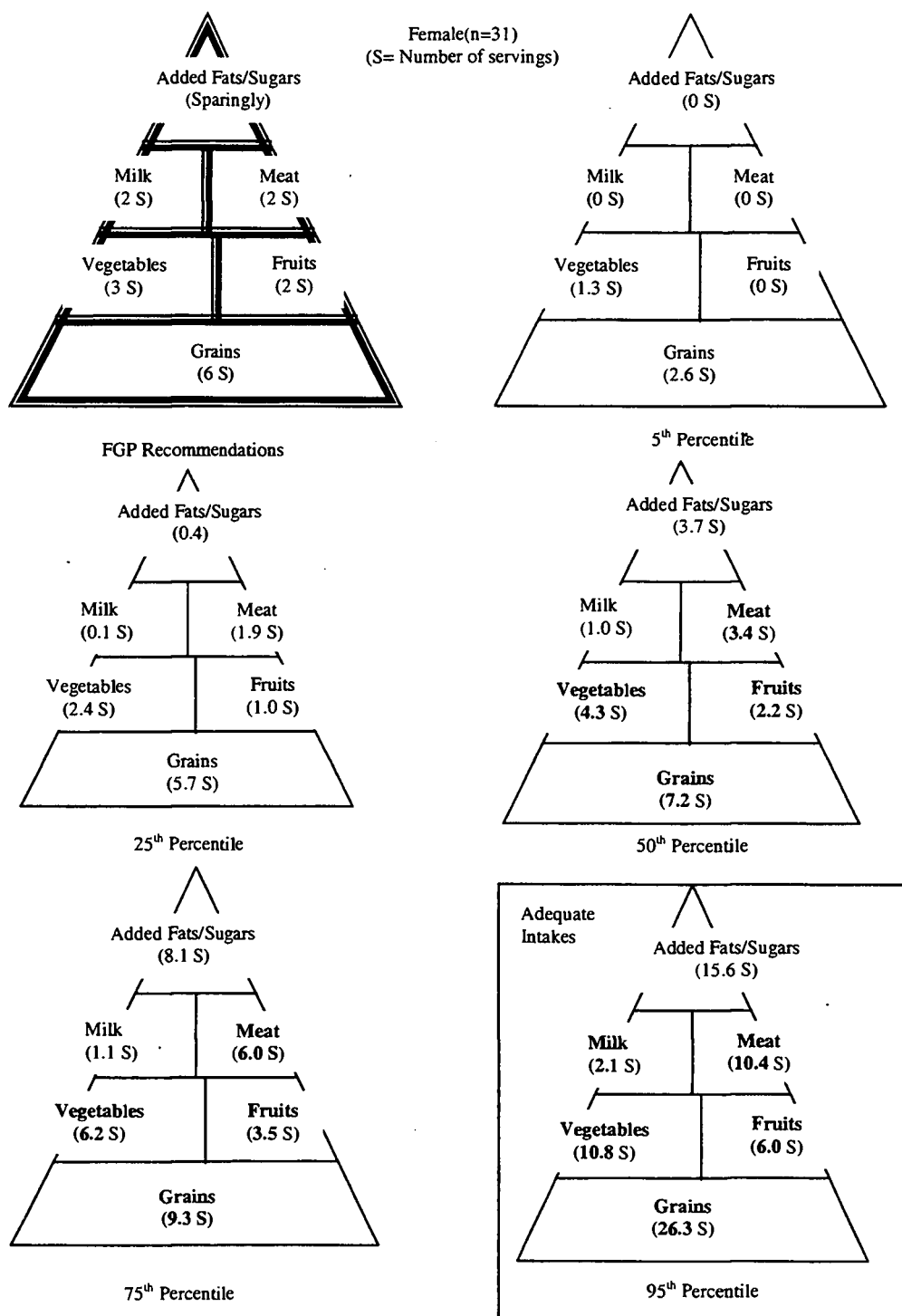
Figure 3. Number of servings (S) of foods from each food group compared to the recommendations from the U.S. Food Guide Pyramid (FGP) among the Chinese elderly female participants (n=31) at the intake levels of 5th, 25th, 50th, 75th, and 95th percentiles.

participants met the recommended number of servings for meats, fruits, vegetables, and grains at the $50^{th}$ percentile level of intakes (for the male participants: 3.6 servings of meat, 4.4 servings of vegetables, 2.0 servings of fruits, and 7.9 servings of grains; for the female participants: 3.4 servings of meat, 4.3 servings of vegetables, 2.2 servings of fruits, and 7.2 servings of grains). For the milk products, at the $95^{th}$ percentile, both the male and female elderly participants met the recommended number of servings (for the male participants: 2.8 servings of milk; for the female participants: 2.1 servings of milk). This research result found that fifty percent of the Chinese elderly participants had adequate food consumption of meat, fruits, vegetables, and grains food groups, and only five percent of the Chinese elderly participants had adequate food consumption of milk products compared to the U.S. Food Guide Pyramid.

The Chinese elderly men were more likely to consume meat and vegetables than the Chinese elderly women according to the research results shown in the Figure 2 and Figure 3. Seventy-five percent of male participants had met their meat recommendation first (meat = 2.3 servings at $25^{th}$ percentile), followed by the recommendations for vegetables (vegetables = 3.0 servings at $25^{th}$ percentile), fruits (fruits = 2.0 servings at $50^{th}$ percentiles), and grains (grains = 7.9 servings at $50^{th}$ percentile) compared to fifty percent of female participants who had met their recommendations for meat (meat = 3.4 servings at $50^{th}$ percentiles), vegetables (vegetables = 4.3 servings at $50^{th}$ percentiles), fruits (fruits = 2 servings at $50^{th}$ percentiles), and grains (grains = 7.2 servings at $50^{th}$ percentile). At the $75^{th}$

percentile level of intake, male participants had slightly higher intakes of milk (1.5 servings), fruits (3.6 servings), vegetables (7.8 servings), and grains (10.4 servings), and lower intakes of meat (4.2 servings) than female participants (1.1 servings of milk, 3.5 servings of fruits, 6.2 servings of vegetables, 9.3 servings of grains, and 6.0 servings of meat). Except the meat intakes, which the Chinese female ate more than male according to the food consumption research results, which were similar to the 1994-1996 USDA Continuing Survey of Food Intakes by Individuals (194, 195) which identified male elderly age 60 or older were more likely to have a higher intakes of fruits, vegetables, grains, and meat than the female counterparts.

**The null hypothesis two (Ho2), the Chinese elderly do not have adequate food intakes,** was accepted according to the results from the daily food consumption. These research results showed that there were ninety-five percent of male and female Chinese elderly participants who consumed below the recommended levels of food intakes for all the food groups daily according to the U.S. Food Guide Pyramid. In other words, there were only five percent of the Chinese elderly males and female participants' food consumption meeting the recommended number of servings for each food group of the U.S. Food Guide Pyramid (FGP) daily. Therefore, the Chinese elderly participants did not have adequate daily food consumption compared to the FGP and the null hypothesis 2 (Ho2) was accepted.

The food items for each food group according to the U.S. Food Guide Pyramid were consumed at the intake levels of $25^{th}$, $50^{th}$, $75^{th}$, and $95^{th}$ percentile among the Chinese elderly participants, which are illustrated in Table 11. In the meat group, fish showed the highest amount of consumption at $50^{th}$, $75^{th}$, and $95^{th}$ percentile (1.0 servings, 1.5 servings, and 4.1 servings, respectively), followed by pork (0.25 servings, 1.0 servings, and 4.2 servings, respectively). Chicken was the third choice of meat type among the participants that showed twenty-five percent of participants had one serving of chicken daily. Among the milk products, whole milk was the first choice among twenty-five percent of participants who drank one serving of whole milk daily, compared to low-fat milk, skim milk, soy milk, and yogurt were the most popular choices among five percent of the participants who had one serving of milk products daily. Among the vegetable group, Asian vegetables were the first choice, seventy-five percent of the elderly participants had at least one-third of a serving and fifty percent of the elderly participants had at least two servings of Asian vegetables daily. As the Chinese elderly participant consumption of Asian vegetables increased, the variety of the vegetables was eaten also increased. Tomatoes and carrots (50% had at least 0.3 servings and 25% had at least 1.0 serving a day), dark green vegetables (25% had at least 0.8 servings and 5% had at least 2.0 serving a day), green leafy vegetables (25% had at least 0.7 servings and 5% had at least 1.8 serving a day), and potatoes were the following choices among the participants (25% had at least 0.5 servings and 5% had at least 3.0 serving a day). Asian vegetables and potatoes showed the highest amounts of

## Table 11

The number of servings at 25th, 50th, 75th, and 95th percentile level of intakes of food items from each food group according to the U.S. Food Guide Pyramid among the Chinese elderly participants (n=58)

| Number of servings | 25[th*] | 50[th*] | 75[th*] | 95[th*] |
|---|---|---|---|---|
| **Meat** | | | | |
| Chicken | 0 | 0 | 1.0 | 2.6 |
| Fish | 0 | 1.0 | 1.5 | 4.1 |
| Pork | 0 | 0.3 | 1.0 | 4.2 |
| Tofu | 0 | 0 | 0.5 | 2.0 |
| Egg | 0 | 0 | 0.5 | 1.5 |
| **Milk** | | | | |
| Whole | 0 | 0 | 1.0 | 1.0 |
| Low-fat[1] | 0 | 0 | 0 | 2.0 |
| Skim | 0 | 0 | 0 | 1.0 |
| Yogurt | 0 | 0 | 0 | 1.0 |
| Milk dessert | 0 | 0 | 0 | 0.1 |
| Cheese | 0 | 0 | 0 | 0.7 |
| Soy | 0 | 0 | 0 | 1.0 |
| **Vegetables** | | | | |
| Potato | 0 | 0 | 0.5 | 3.0 |
| Dark green[2] | 0 | 0 | 0.8 | 2.0 |
| Tomato/Carrot | 0 | 0.3 | 1.0 | 2.0 |
| Lettuce | 0 | 0 | 0 | 1.3 |
| Green leafy[3] | 0 | 0 | 0.7 | 1.8 |
| Starchy[4] | 0 | 0 | 0 | 0.8 |
| Asian[5] | 0.3 | 2.0 | 3.1 | 7.1 |
| **Fruits** | | | | |
| Citrus | 0 | 0.5 | 1.5 | 2.5 |
| Apples | 0 | 0 | 0 | 1.5 |
| Banana | 0 | 0 | 0 | 2.0 |
| Melons, berries, grapes | 0 | 0 | 0 | 1.8 |
| Juices | 0 | 0 | 0 | 1.3 |
| Asian[6] | 0 | 0 | 0 | 1.3 |
| **Grains** | | | | |
| Whole wheat[7] | 0 | 0 | 1.0 | 3.1 |
| Yeast white[8] | 0 | 0 | 2.0 | 3.0 |
| Cereals | 0 | 0 | 0 | 3.0 |
| RTE cereals[9] | 0 | 0 | 0 | 1.0 |
| Rice (white) | 0 | 2.3 | 4.1 | 7.2 |
| Noodles[10] | 0 | 0 | 2.4 | 7.3 |
| Crackers | 0 | 0 | 0 | 2.0 |
| Cake, cookies | 0 | 0 | 0 | 2.0 |

*Numbers reported in number of servings according to the U.S. Food Guide Pyramid.
[1]Lowfat milk includes 1% and 2% milk fat types of milk.
[2]Dark green vegetables include broccoli, mustard green, parsley, kale, chard, and collard greens.
[3]Green leafy vegetables include green bean, cauliflower, cabbage, onion, cucumbers, water chestnuts, peppers, and celery.
[4]Starchy vegetables include corn, lima bean, and pea.
[5]Asian vegetables include Chinese cabbage, Chinese chi, little Chinese white cabbage, and green onion.
[6]Asian fruits include Asian pears and pamelo.
[7]Whole wheat grains include whole wheat breads and brown rice.
[8]Yeast white grains include all white breads.
[9]RTE cereals include all cold cereals that are ready-to-eat.
[10]Noodles include all types of noodles.

vegetable consumptions (7.1 servings and 3 servings) over other types of vegetables among the five percent of participants (at the 95th percentile intake level). This research results reflected that Asian vegetables and potatoes were the most popular vegetable choices among the Chinese elderly participants who consumed a lot of vegetables. Among fruit group, citrus fruits were consumed by fifty percent of the Chinese elderly participants (citrus = 0.5 serving at 50th percentiles) and it was also consumed the most (2.5 servings) compared to banana (2.0 servings), melons and berries (1.8 servings), apples (1.5 servings), and juices and Asian fruits (1.3 servings and 1.3 servings) among the participants who consumed a lot of fruits. In grain food group, white rice (7.2 servings) and noodles (7.3 servings) were the most popular kinds of grains. Twenty-five percent of the participants had at least 4.1 servings of rice and 2.4 servings of noodles daily. Noodles showed the highest amount of intake (7.3 servings) a day among the participants who ate a lot of grain products daily.

To summarize the daily food items consumption research results, the Chinese elderly participants reported that they were more likely to choose fish, pork, and chicken as their meat intake and whole milk as their milk products intake. The Asian vegetables were consumed the most followed by tomatoes and carrots as their vegetables, citrus fruits as the fruit intake, and noodles and rice as their grain intake. Among the participants who consumed the highest amount of foods from all food groups, pork and fish, low-fat milk, Asian vegetables, citrus fruits, and noodles were consumed the most as compared to the participants who consumed

the lower amount of foods from all food groups, who chose fish, whole milk, Asian

vegetables, citrus, and rice.

The dietary snack habits of the Chinese elderly participants and the types of

food they choose as snacks according to the U.S. Food Guide Pyramid are listed in

Table 12. Sixty-four percent and forty percent of the snacks were added fats/sugars

and grains food items, such as reported as donuts and candies. Thirty-three percent

of the snack food items chosen by the participants were reported as fruits. Snacking

was not a traditional Chinese dietary habit. However, it provided additionally

important nutrient requirements when the snack choices were healthy. The

snacking dietary habit was adapted from living in the U.S. Nutritional education on

healthy snacking choices for the Chinese elderly would be important to increase the

nutrient intake, such as calcium.

**Table 12**

Type of food chosen for snacks according to the U.S. Food Guide
Pyramid among Chinese elderly participants (n=58)

| Type of food for snacks | Participants | | | |
|---|---|---|---|---|
| | Yes | | No | |
| | # | % | # | % |
| Food Groups | | | | |
|    Added fats or sugars | 37 | 64 | 21 | 36 |
|    Meat | 3 | 5 | 55 | 95 |
|    Dairy | 3 | 5 | 55 | 95 |
|    Fruits | 21 | 33 | 39 | 67 |
|    Vegetables | 2 | 3 | 56 | 97 |
|    Grains | 23 | 40 | 35 | 60 |

The eating locations of breakfast, lunch, and dinner for Chinese elderly participants are listed in Table 13. Majority of the Chinese elderly participants ate their breakfast (98%), lunch (97%), and dinner (97%) at home. Eating at home with family members reflected a traditional Chinese custom of eating location. However, meal eaten away from home which affected the nutrients intakes among Chinese elderly would need further investigation.

**Table 13**
Eating locations for breakfast, lunch, and dinner among the Chinese elderly participants (n=58)

| Eating locations | Participants | |
|---|---|---|
| | # | % |
| Breakfast | | |
| Home | 57 | 98 |
| Restaurant | 1 | 2 |
| Coffee shop | 0 | 0 |
| Senior center | 0 | 0 |
| Friends and family's | 0 | 0 |
| Lunch | | |
| Home | 56 | 97 |
| Restaurant | 2 | 3 |
| Coffee shop | 0 | 0 |
| Senior center | 0 | 0 |
| Friends and family's | 0 | 0 |
| Dinner | | |
| Home | 56 | 97 |
| Restaurant | 2 | 3 |
| Coffee shop | 0 | 0 |
| Senior center | 0 | 0 |
| Friends and family's | 0 | 0 |

**Nutritional health risk status results.** Research results from the modified DETERMINE Checklist that was designed for this study are listed in Table 14.

The researcher asked the Chinese elderly participants about their consumptions of

fruits, vegetables, and milk products separately instead of one integrated question

in the standardized DETERMINE Checklist. Quantified questions asking about

food consumption were adopted from the Level I Screen, were also integrated in

the modified DETERMINE Checklist. For example, instead of asking the Chinese

elderly participants "Do you eat few fruits, vegetables, or milk products?" the

question was modified as three questions: (1) "Do you eat vegetables two or fewer

times daily?" (2) "Do you eat milk or milk products once or not at all daily?"; and

(3) "Do you eat fruits or drink fruit juices once or not at all daily?". Additionally,

researcher asked participants about their physically capability of shopping,

cooking, and feeding themselves. These questions were also asked separately

instead of one integrated question in the standardized DETERMINE Checklist.

The results showed that the participants were more likely to report that they ate

milk or milk products once or not at all daily (22% reported "always" and 67%

reported "never") compared to eating fruits or drinking fruit juices once or not at all

daily (5% reported "always" and 78% reported "never") and eating vegetables two

or fewer times daily (17% reported "always" and 69% reported "never").

In the research results of physical capacity of shopping, cooking, and

feeding themselves revealed only three percent of participants reported that they

were unable to shop themselves. These were not related to the "capability of

physical function" but related to the "transportation" issues. An informal comment

from a 74-year-old female Chinese elderly participant was that:

**Table 14**

Responses to the Modified DETERMINE Checklist questions among Chinese Elderly Participants (n=58)

| Modified DETERMINE Checklist questions | Responses | | | | | |
|---|---|---|---|---|---|---|
| | Always | | Sometimes | | Never | |
| | No. | % | No. | % | No. | % |
| Do you have illness or condition that made you change the kind and amount of food you eat? | 21 | 36 | 6 | 10 | 31 | 54 |
| Do you eat fewer than 2 meals per day? | 0 | 0 | 1 | 2 | 57 | 98 |
| Do you eat few fruits, vegetables, or milk products? | | | | | | |
| Eat fruits or drink fruit juices once or not al all daily | 3 | 5 | 10 | 17 | 45 | 78 |
| Eat vegetables two or fewer times daily | 10 | 17 | 8 | 14 | 40 | 69 |
| Eat milk or milk products once or not at all daily | 13 | 22 | 6 | 10 | 39 | 67 |
| Do you have 3 or more drinks of beer, liquor, or wine almost every day? | 1 | 2 | 0 | 0 | 57 | 98 |
| Do you have tooth or mouth problems that make it hard for you to eat? | 7 | 12 | 9 | 16 | 42 | 72 |
| Do you always have enough money to buy the food you need? | 54 | 93 | 1 | 2 | 3 | 5 |
| Do you eat alone most of the time? | 10 | 17 | 3 | 5 | 45 | 78 |
| Do you take 3 or more different prescribed or over-the-counter drugs a day? | 21 | 36 | 2 | 4 | 35 | 60 |
| Without wanting to, have you lost or gained 10 pounds in the last 6 months? | 0 | 0 | 6 | 10 | 52 | 90 |
| Are you always physically able to shop, cook, and/or feed yourself? | | | | | | |
| Shop yourself | 2 | 3 | 6 | 10 | 50 | 87 |
| Cook yourself | 0 | 0 | 4 | 7 | 54 | 93 |
| Feed yourself | 0 | 0 | 0 | 0 | 58 | 100 |

> "I don't know how to drive, but my daughter takes me to the store on the weekend, and I do the most grocery store shopping for the family.......I normally cook for the family when my daughter is busy with her work."

Therefore, the integrated question on physically able to shop, cook, and feed themselves from the standardized DETERMINE Checklist would not show the actual results without asking the questions separately as the modified questions used in this research.

Research results of the nutritional health risk status indicators from the modified DETERMINE Checklist showed that the Chinese elderly participants were generally less likely to have nutritional health risks, except the illness conditions they had affecting the kind and amount of food they eat, and taking three or more prescribed drugs daily. The participants reported that they were less likely to have the illness conditions they had affecting the kind and amount of food they eat, (36% reported "always" and 54% reported "never") and taking three or more prescribed drugs daily eat fewer than two meals a day (0% reported "always" and 98% reported "never"), drink alcohol more than three times daily (2% reported "always" and 98% reported "never"), and have tooth or mouth problems affecting eating (12% reported "always" and 72% reported "never"). Additionally, the Chinese participants were less likely to eat alone (17% reported "always" and 78% reported "never"), take three or more prescribed or over-the-counter drugs a day (36% reported "always" and 60% reported "never"), or lose/gain more than ten pounds in the last six months (0% reported "always" and 90% reported "never").

On the other hand, they were more likely to have enough money to buy the food they needed (93% reported "always" and 5% reported "never"). About half of the participants (46%) reported that they "always" (36%) and "sometimes" (10%) had illness or condition that made them change the kind and amount of food they eat. Many informal comments on the diet changes were related to the disease conditions they had, such as diabetes or hypertension, which they had to reduce the amount of sugar or sodium intakes. The disease condition could also be related to the reported results of forty percent of participants who said they "always" (36%) or "sometimes" (4%) take three or more different prescribed drugs daily.

To summarize the research results from the assessment of nutritional health risk status of the Chinese elderly participants, they did not show an increased nutritional health risk according to the modified DETERMINE Checklist. The Chinese elderly participants were more likely to report "never" for all the nutritional health risk indicators from the modified DETERMINE Checklist. Only the questions asking about the illness condition changed the kind and amount of food they eat and taking three or more different prescribed drugs daily. There were higher percentages of the Chinese elderly participants who reported "always" and "sometimes" for the questions of "illness or condition made them changing the kind and amount of foods they eat" and "take three or more prescribed or over-the-counter drugs daily" compared to the answers to other questions.

The research results of eating habits from the Level I Screen nutritional health risk status assessment are listed in Table 15. The participants had reported

**Table 15**

Responses to the Level I Screen questions among Chinese Elderly Participants (n=58)

| Questions from the Level I Screen | Responses | | | | | |
|---|---|---|---|---|---|---|
| | Always | | Sometimes | | Never | |
| | # | % | # | % | # | % |
| Body weight | | | | | | |
| Have lost or gained 10 pounds (or more) in the last 6 months | 0 | 0 | 6 | 10 | 52 | 90 |
| Eating habits | | | | | | |
| Does not have enough food to eat each day | 1 | 2 | 1 | 2 | 56 | 96 |
| Usually eats alone | 10 | 17 | 3 | 5 | 45 | 78 |
| Does not eat anything on one or more days each month | 0 | 0 | 1 | 2 | 57 | 98 |
| Has poor appetite | 4 | 7 | 2 | 3 | 52 | 90 |
| Is on a special diet | 4 | 7 | 3 | 5 | 51 | 88 |
| Eats vegetables two or fewer times daily | 10 | 17 | 8 | 14 | 40 | 69 |
| Eats milk or milk products once or not at all daily | 13 | 22 | 6 | 10 | 39 | 68 |
| Eats fruits or drinks fruit juice once or not at all daily | 3 | 5 | 10 | 17 | 45 | 78 |
| Eats breads, cereals, pasta, rice, or other grains five or fewer times daily | 43 | 74 | 7 | 12 | 8 | 14 |
| Has difficulty chewing or swallowing | 2 | 3 | 4 | 7 | 52 | 90 |
| Has more than one alcoholic drink per day (if women); more than two drinks per day (if men) | 0 / 1 | 0 / 3 | 0 / 0 | 0 / 0 | 27 / 30 | 100 / 97 |
| Has pain in mouth, teeth, or gums | 7 | 12 | 9 | 16 | 42 | 78 |

**Table 15 (Continued)**

Responses to the Level I Screen questions among Chinese Elderly Participants (n=58)

| Questions from the Level I Screen | Responses | | | | | |
|---|---|---|---|---|---|---|
| | Always | | Sometimes | | Never | |
| | # | % | # | % | # | % |
| Living environment | | | | | | |
| Lives on an income of less than $6000 per year (per individual in the household) | 32 | 55 | 0 | 0 | 26 | 45 |
| Live alone | 12 | 21 | 0 | 0 | 46 | 79 |
| Is housebound | 14 | 24 | 10 | 17 | 34 | 59 |
| Is concerned about home security | 24 | 41 | 8 | 14 | 26 | 45 |
| Lives in a home with inadequate heating or cooling | 0 | 0 | 0 | 0 | 58 | 100 |
| Does not have a working stove and/or refrigerator | 0 | 0 | 0 | 0 | 58 | 100 |
| Is unable or prefers not to spend money on food (<$25-30 per person spend on food each week) | 7 | 12 | 2 | 3 | 49 | 85 |
| Functional status | | | | | | |
| Usually or always needs assistance with | | | | | | |
| Bathing | 0 | 0 | 2 | 3 | 56 | 97 |
| Dressing | 1 | 2 | 1 | 2 | 56 | 96 |
| Grooming | 0 | 0 | 0 | 0 | 58 | 100 |
| Toileting | 0 | 0 | 0 | 0 | 58 | 100 |
| Eating | 0 | 0 | 0 | 0 | 58 | 100 |
| Walking or moving about | 2 | 3 | 5 | 9 | 51 | 88 |
| Traveling (outside the home) | 3 | 5 | 5 | 9 | 50 | 86 |
| Preparing food | 2 | 3 | 3 | 5 | 53 | 92 |
| Shopping for food or other necessities | 2 | 3 | 6 | 11 | 50 | 86 |

good eating and drinking habits, except poor intakes of grains. Ninety-six percent reported that they "never" have not enough food to eat, seventy-eight percent had reported "never" ate alone, ninety-eight percent reported "never" had not eaten anything on one or more days each month, ninety percent reported "never" had poor appetite, ninety percent reported "never" had difficulty chewing or swallowing. One-hundred percent and ninety-seven percent of females and males reported that they "never" drank alcohol more than once or twice daily. Only seventeen percent reported they "always" ate alone and seven percent reported that they were "always" on a special diet. The food intakes of the participants, seventeen percent reported "always" ate vegetables two or fewer times daily, twenty-two percent reported "always" consumed milk or milk products once or not at all daily, and five percent reported "always" ate fruits once or not at all daily. Almost three-quarters of participant reported that they "always" ate grains five times or fewer daily (74%).

The Level I Screen provided additional nutritional health risk assessment information compared to using only the DETERMINE Checklist among the Chinese elderly participants. The nutritional health assessment research results of the eating habits of the Chinese elderly participants using the Level I Screen showed that they were likely to have enough food to eat each day, not eat alone, and not likely to not eat anything on one or more days each month, have poor appetite, on a special diet, eat vegetables two or fewer times daily, eat fruits or drink fruit juice once or not at all daily, have difficult chewing or swallowing, have

more than one alcohol drink, and have pain in mouth, teeth or gums. Compared to the nutritional health risk status assessment of using the DETERMINE Checklist and the Level I Screen to evaluate the nutritional health status of the Chinese elderly participants, the results from the Level I Screen showed additional risk of eating grains five times or fewer daily in the Level I Screen. Therefore, the Level I Screen provided more nutritional health risk information of eating habits related to grains consumption for the Chinese elderly participants.

The additional nutritional health risk information of eating grains five times or fewer daily using the Level I Screen was not an important risk predictor of nutritional health status for the Chinese elderly. The Chinese elderly usually consumed grains three times a day as they usually ate three meals daily. The total amount of grains they consumed in three meals daily could meet the recommendation of six servings of grains daily according to the U.S. Food Guide Pyramid. For example, if a Chinese elderly person ate a bowl of rice for breakfast and lunch and two bowls of rice for dinner daily which was a typical Chinese eating habit, the total number of servings of grains for that day was equal to six (1 bowl = 1.5 cups). In the nutritional health risk assessment using the Level I Screen, the Chinese elderly person would be at nutritional risk, whereas in the adequacy of food consumption assessment, this Chinese elderly person would not be at nutritional risk.

The research results of living and economic environments of the Chinese elderly participants are listed in Table 15. The majority (55%) of the Chinese

elderly participants reported that they "always" live on an income of less than

$6,000 per year, "never" live alone (79%), "never" live in a home with inadequate

heating or cooling (100%), and "never" does not have a stove and/or refrigerator

(100%). Twenty-four percent of the participants reported that they "always"

housebound and forty-one percent were "always" concerned about home security.

Income of the Chinese elderly participants was below the 1996 poverty level

($7,500/year). All the elderly participants were retired and preferred to spend

money on food (85%). They prepared food at home, which was a coping strategy

of living on an income of less than the poverty level. Other income sources, such

as from the younger family members, reduced the nutritional health risk because

the majority (79%) of the Chinese elderly participants reported that they "never"

live alone. An informal comment from a Chinese elderly woman age 76 years old,

a retired schoolteacher, who lived with her son, daughter-in-law, and two

grandsons:

> "After I had a heart attack six months ago, I had to move-in with my
> son...Now, I never have to worry about the food parts in the house,
> my son and daughter-in-law always prepare the food and do the
> grocery shopping, I don't really have to do anything with cooking or
> shopping. They all take care of it."

Therefore, the detailed complex interactions between incomes affecting the

nutritional health risk status and other reasons, such as health status and living with

family members, among the Chinese elderly participants need further studies.

Qualitative research can provide more detailed investigations. The Chinese elderly

participants who reported, "being housebound" and "concerned about home

security" were not the predictors for the nutritional health status, although twenty-four percent reported "always" being housebound and forty-one percent reported "being concerned about home security". An informal comment from a 70 years old Chinese woman living with her husband, son, and grandchildren:

> "I always checked the doors to see if it is locked. I always do that since I lived in Taiwan. So, I am already used to doing it. Also, I look after the little kids, they could get out of the house, and I could not find them..... Normally, I stay at home with my grand kids. My husband or son will get the stuff I need, I don't have to go out."

The physical function status of the Chinese elderly participants is also listed in Table 15. The overall physical functions of the participants were reported ranging form 92% to 100% who reported they "never" needed assistance in preparing food, dressing, bathing, grooming, and toileting. Five percent and nine percent of the participants reported that they "always" and "sometimes" required assistance in walking or moving about, three percent and five percent reported that they "always" and "sometimes" required assistance in traveling outside the home, and three percent and eleven percent that they reported "always" and "sometimes" required assistance in shopping for food or other necessities. Physical function that required assistance in traveling outside the home affected the " health status". An informal comments from a 74-year-old woman and her husband who had diagnosed with diabetes who was living with her daughter and son-in-law and grandchildren was:

> "After I had been diagnosed with diabetes, I have trouble with walking outside of the house. Sometimes, I feel dizzy when I take a

shower. One time I went out for my morning walk, I fell down and my neighbor had to call my husband to pick me up. That was embarrassing. After that, I hardly go outside by myself anymore."

**Table 16**

Responses to the Level I Screen questions of Body Weight among Chinese Elderly Participants (n=58)

| Question from the Level I Screen | Male (n=27) | | Female (n=31) | |
|---|---|---|---|---|
| | # | % | # | % |
| Body weight | | | | |
| BMI[1] < 24 | 18 | 67 | 14 | 45 |
| BMI[1] > 27 | 1 | 4 | 12 | 39 |
| [1] BMI (Body Mass Index) = weight (kilogram)/ height$^2$ (meters) | | | | |

The research results on the body weight from the Level I Screen among the Chinese elderly participants are listed in the section of body weight discussing the weight lost or gained more than ten pounds in the last six month in Table 15. The calculation results from the body weights and heights to Body Mass Index (BMI) are listed in Table 16. Ninety percent of the participants reported that they "never" had lost or gained more than ten pounds in the last six months. The BMI showed the majority of the Chinese elderly participants who had a BMI of less than 24 for both male and female. There were more male (67%) than female (45%) Chinese elderly participants had BMI less than 24. However, there were also more Chinese female elderly participants had a BMI more than 27 (39%) than their male counterparts (4%). These research results showed that the Chinese elderly women were more likely to be "obese" (BMI>27) than the Chinese elderly men.

Therefore, nutrition educators would need to pay more attention in the nutrition intervention program of weight reduction for the Chinese elderly women, which was also suggested in the study done by Hu et al. in 2000 (202).

**Statistical research results of the nutritional health risk status.** The hypotheses testing and statistic results examining the relationship between independent variables and dependent variables are identified in this section. The dependent variables were:

(1) the adequacy of food intake determined by the Food Variety Score (FVS), and

(2) nutritional health risk status determining by the Nutritional Risk Score (NRS). The NRS was the sum of each question of the weighted risk score from the modified DETERMINE Checklist. If the questions were modified into separate questions, then each counted the same weighted risk score indicated in the standardized DETERMINE Checklist weighted risk score for each question. The nutrition and health related independent variables for the participants were:

(1) demographic variables; age, gender, education, and type of community

(2) acculturation variables; length of time living in the U.S. and generations

(3) language competency variables; translators required for interviews and ability to speak or read English doing grocery shopping

(4) attitude and awareness of nutrition variables; participants rated their health status, the importance of nutrition to health, if they were taking nutritional supplements, and if they wanted to know the research results

**Table 17**

Pearson correlation coefficient (r), F-value (F) from the Analysis of Variance analyses, or t-values (t) from the t-test and p-values between nutrition and health-related variables, and Food Variety Score (FVS) and Nutritional Risk Score (NRS).

| Nutrition and health-related variables | FVS | | NRS | |
|---|---|---|---|---|
| | Values | P-value | Values | P-value |
| **Demographics** | | | | |
| Age | r= -0.20 | 0.14 | r= -0.14 | 0.30 |
| Gender | t= -18.04 | 0.00* | t= 0.32 | 0.00* |
| Education | F= 0.94 | 0.47 | F= 1.87 | 0.11 |
| Type of community | F= -0.03 | 0.97 | F= 1.39 | 0.26 |
| **Acculturation** | | | | |
| Length in the US | F= 0.72 | 0.61 | F= 1.89 | 0.11 |
| Generation | F= 1.19 | 0.32 | F= 0.17 | 0.91 |
| **Language competency** | | | | |
| Require translator | t= 19.24 | 0.00* | t= -62.77 | 0.00* |
| Speak or read English when shop | F= 1.59 | 0.21 | F= -59.67 | 0.00* |
| **Attitude and Awareness** | | | | |
| Self-rated health | F= -0.08 | 0.38 | F= -0.32 | 0.01* |
| Importance of nutrition to health | r= 0.08 | 0.55 | r= 0.04 | 0.75 |
| Taking nutritional supplements | F= 2.56 | 0.09* | F= 0.78 | 0.46 |
| Want to know research result | t= 19.24 | 0.00* | t= -60.04 | 0.00* |
| **Accessibility** | | | | |
| Eat Asian foods in the US | F= 2.65 | 0.08* | F= 2.30 | 0.11 |
| **Government benefits** | | | | |
| Oregon Trail Card Program | t= -18.24 | 0.00* | t= -62.49 | 0.00* |
| Senior Nutrition Program | t³= -18.26 | 0.00* | t= -62.53 | 0.00* |
| Social Security Insurance | t³= -17.87 | 0.00* | t= -62.05 | 0.00* |
| Medicaid | ------** | ------** | ------** | ------** |
| Medicare | t= -17.99 | 0.00* | t= -61.68 | 0.00* |
| Health insurance coverage | F²= -17.76 | 0.00* | F= -61.18 | 0.00* |
| **Health status** | | | | |
| BM1 | r= -0.06 | 0.68 | r= 0.36 | 0.01* |
| Number of diseases | r= 0.08 | 0.57 | r= 0.49 | 0.00* |

*p<0.10
**None of the participants was the recipients of the Medicaid at the time of interview.

(5) accessibility to Asian food variable; did they eat Asian foods in the U.S.

(6) receiving government benefits or not, including each kind of governmental

benefits: Oregon Trail Card Program, Senior Nutrition Program, Social

Security Insurance, Medicaid, and Medicare

(7) health insurance coverage or not

(8) health status; Body Mass Index (BMI) and number of diseases.

The association between the dependent variables and independent variables

were estimated by the Pearson correlation coefficient (r), and comparing the means

using the t-test (t-value) or Analysis of Variance (F-value), and p-value (p) to

determine if the associations were significant at level of p-value=0.10 (Table 17).

The association between the questions from the standardized DETERMINE

Checklist and FVS, and the questions from the Level I Screen and FVS were

identified by the Pearson correlation (r) coefficient and Analysis of Variance (F-

value) with the significant p-value at 0.10 level are listed in Table 18 and Table 19.

Multiple regression was used to determine the significant predictors at p-

value=0.10, the questions from the modified DETERMINE Checklist, for the

dependent variables, the FVS (Table 20).

The relationship between the independent variables and the dependent

variables, the adequacy of food consumption evaluated by the Food Variety Score

(FVS), are listed in Table 17. The adequacy of food intakes were significantly

different between gender (t=-18.04, p=0.00<0.10), require translators (t=19.24,

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p=0.00<0.10), taking nutrition supplements (F=2.56, p=0.09<0.10), want to know

the research result (t=19.24, p=0.00<0.10), and eating Asian foods in the U.S.

(F=2.65, p=0.09<0.10) among the participants. There were also significant

differences between the participants who received government benefits, including

the Oregon Trail Card Program (t=-18.24, p=0.00<0.10), Senior Nutrition Program

(t=-18.2, p=0.00<0.10), Social Security Insurance (t=-17.87, p=0.00<0.10), and

Medicare (t=-17.99, p=0.00<0.10), and those who did not receive the benefits. The

research results showed that gender difference, ability to communicate in English,

awareness of nutrition and health (including taking nutritional supplement and want

to know the research result), accessibility to the Asian foods, receiving government

benefits, and health insurance coverage could affect the adequacy of food

consumption.

Eating habits including taking nutritional supplements could be a

"compensation" for inadequate food consumption among the Chinese elderly

participants. One 84-year-old female Chinese participant had researcher that:

> " I don't have very good appetite now, and I know that I don't eat
> well. But I take one multi-vitamin and one vitamin C everyday, so I
> won't have to worry about my poor nutrition."

Taking nutritional supplements to "compensate" the poor appetite instead of

finding the reason causing poor appetite can lead to serious malnutrition problems.

Eating Asian foods in the U.S. reflected maintaining traditional Chinese dietary

habits. The traditional Chinese dietary habits included eating a diet that consisted

of a large amount of carbohydrates, vegetables, and fruits, which could imply

adequate food consumption reflected in the increased FVS.

The relationship between the independent variables and the nutritional

health risk status determined by the Nutritional Risk Score (NRS) are listed in

Table 17. Gender difference ($t=0.32$, $p=0.01<0.10$), requiring translator ($t=-62.77$,

$p=0.00<0.10$), speaking or reading English when shop ($F=-59.67$, $p=0.00<0.10$),

and wanting to know the research results ($t=-60.04$, $p=0.00<0.10$) showed

significant effects on the nutritional health risk status. Receiving government

benefits and having health insurance coverage could also affect the nutritional

health risk status among the participants. Self-rated health status ($F=-0.32$,

$p=0.01<0.10$), Body Mass Index (BMI) ($r=0.36$, $p=0.01<0.10$), and number of

diseases the participants had ($r=0.49$, $p=0.00<0.10$) had significant associations

with NRS. Nutritional health risk status increased with the decreased of self-rated

health status among the elderly participants that were similar to the study reported

by Damian et al. which indicated that increased number of chronic diseases could

decrease self-rated health status (197).

**The null hypothesis one (Ho1) stated the DETERMINE Checklist and
Level I Screen in combination with 24-hour dietary recall cannot identify
nutritional health risk indicators,** was rejected according to the association using

the Pearson correlation (correlation coefficient, r) and the comparison of means

using the Analysis of Variance (F-value) between the questions from the

standardized DETERMINE Checklist and the Level I Screen, and adequacy of food

consumption determining by the Food Variety Score (FVS) are listed in Table 18

and Table 19, respectively.

**Table 18**
Analysis of Variance and p-values between the questions from the standardized
DETERMINE Checklist and Food Variety Score (FVS) among the Chinese
elderly participants (n=58)

| Questions from the standardized DETERMINE Checklist | FVS | |
|---|---|---|
| | F-value | P-value |
| Do you have illness or condition that made you change the kind and amount of food you eat? | 0.21 | 0.65 |
| Do you eat fewer than 2 meals per day? | 0.61 | 0.44 |
| Do you eat few fruits, vegetables, or milk products? | 0.09 | 0.77 |
| Do you have 3 or more drinks of beer, liquor, or wind almost every day? | 0.45 | 0.51 |
| Do you have tooth or mouth problem that make it hard for you to eat? | 0.06 | 0.82 |
| Do you always have enough money to buy the food you need? | 0.19 | 0.66 |
| Do you eat alone most of the time? | 0.81 | 0.38 |
| Do you take 3 or more different prescribed or over-the-counter drugs a day? | 0.68 | 0.42 |
| Without wanting to, do you have lost or gained 10 pounds in the last 6 months? | 0.43 | 0.52 |
| Are you always physically able to shop, cook, and/or feed yourself? | 0.83 | 0.37 |

None of the questions in the standardized DETERMINE Checklist showed

a significant association with FVS. But in the eating habits of the Level I Screen,

the questions on "usually eats alone" (F=6.35, p=0.00<0.10) and "eating fruits or

drinking fruit juice once or not at all daily" (F= -3.03, p=0.05<0.10) affected the

FVS significantly. In the living environment of the Level I Screen, "concerned

about home security", affected the FVS significantly. Therefore, the Level I Screen

did provide additional nutritional health risk indicators, such as eating fruits or

drinking fruit juices once or not al all daily, usually eating alone, and concerning

**Table 19**

Analysis of Variance analyses (F) or Pearson correlation (r), and p-values between the questions from the Level I Screen and Food Variety Score (FVS) among the Chinese elderly participants (n=58)

| Questions from the Level I Screen | FVS | |
|---|---|---|
| | F-value/Pearson Correlation | P-value |
| **Body weight** | | |
| Has lost or gain 10 pounds (or more) in the last 6 months | F= 0.43 | 0.51 |
| BMI[1] | r= -0.06 | 0.68 |
| **Eating habits** | | |
| Does not have enough food to eat each day | F= 0.65 | 0.53 |
| Usually eats alone | F= 6.35 | 0.00* |
| Does not eat anything on one or more days each month | F= 0.61 | 0.44 |
| Has poor appetite | F= 0.65 | 0.53 |
| Is on a special diet | F= 0.05 | 0.96 |
| Eats vegetables two or fewer times daily | F= 0.42 | 0.66 |
| Eats milk or milk products once or not at all daily | F= 1.02 | 0.37 |
| Eats fruits or drinks fruit juice once or not at all daily | F= 3.03 | 0.05* |
| Eats breads, cereals, pasta, rice, or other grains five or fewer times daily | F= 2.17 | 0.12 |
| Has difficulty chewing or swallowing | F= 0.95 | 0.39 |
| Has more than one alcoholic drink per day (if women); more than two drinks per day (if men) | F= 0.45 | 0.51 |
| Has pain in mouth, teeth, or gums | F= 0.06 | 0.82 |
| **Living environment** | | |
| Lives on an income of less than $6000 per year (per individual in the household) | F= 3.36 | 0.07 |
| Live alone | F= 1.07 | 0.30 |
| Is housebound | F= 1.64 | 0.20 |
| Is concerned about home security | F= 3.36 | 0.01* |
| Lives in a home with inadequate heating or cooling | ----** | ----** |
| Does not have a working stove and/or refrigerator | ----** | ----** |
| Is unable or prefers not to spend money on food (<$25-30 per person spend on food each week) | F= 0.17 | 0.52 |
| **Functional status** | | |
| Usually or always needs assistance with | | |
| Bathing | F= 2.69 | 0.11 |
| Dressing | F= 1.77 | 0.18 |
| Grooming | ----** | ----** |
| Toileting | ----** | ----** |
| Eating | ----** | ----** |
| Walking or moving about | F= 1.38 | 0.26 |
| Traveling (outside the home) | F= 0.57 | 0.57 |
| Preparing food | F= 0.13 | 0.88 |
| Shopping for food or other necessities | F= 1.32 | 0.28 |

[1]BMI=Body Mass Index
*p<0.10
**All of the participants reported they had adequate heating or cooking, and a working stove and/or refrigerator or able to perform the physical function themselves at the time of interviews.

about home security, but not the standardized DETERMINE Checklist, for evaluating the adequacy of food consumption.

**The null hypothesis two (Ho2), the Chinese elderly do not have adequate food intakes,** was <u>accepted</u> according to the results from the daily food consumption of Figure 2 and Figure 3 on page 108 and 109, respectively. These research results showed that there were ninety-five percent of male and female Chinese elderly participants who consumed food items below the recommended levels of food intakes for all the food groups daily according to the U.S. Food Guide Pyramid. In other words, there were only five percent of the Chinese elderly males and female participants' food consumption that met the recommended number of servings for each food group of the U.S. Food Guide Pyramid (FGP) daily and the null hypothesis 2 (Ho2) was accepted.

**The null hypothesis 3 (Ho3), the nutritional health risk status is not associated with the adequacy of food intake,** was <u>accepted</u>. The research results showed that there was not a significant association between the adequacy of food intake, determined by the Food Variety Score (FVS), and nutritional health risk status, determined by the Nutritional Health Risk Score (NRS) (r=-0.06, p=0.67>0.10). Therefore, the null hypothesis 3 (Ho3) is accepted.

The results of multiple regression analyses of determining the predictors, the questions from the modified DETERMINE Checklist, to predict the adequacy of food intakes from the Food Variety Score (FVS) are listed in Table 20.

**Table 20**

Multiple regression analyses of the questions from the modified DETERMINE Checklist to predict the adequacy of food intakes from the Food Variety Score (FVS) among the Chinese elderly participants (n=58)

| Questions from the modified DETERMINE Checklist | FVS | | | |
|---|---|---|---|---|
| | Standard Error | Standardized beta | t-value | P-value |
| Do you have illness or condition that made you change the kind and amount of food you eat? | 3.16 | -0.02 | -0.14 | 0.89 |
| Do you eat fewer than 2 meals per day? | 12.36 | 0.01 | 0.045 | 0.97 |
| Do you eat few fruits, vegetables, or milk products? | 5.05 | -0.05 | -0.18 | 0.86 |
| Eat fruits or drinking fruit juices once or not at all daily | 3.38 | -0.34 | -1.81 | 0.08* |
| Eat vegetables two or fewer times daily | 2.87 | 0.05 | 2.31 | 0.82 |
| Eat milk or milk products once or not at all daily | 2.54 | 0.31 | 1.45 | 0.15 |
| Do you have 3 or more drinks of beer, liquor, or wind almost every day? | 12.36 | 0.02 | 0.12 | 0.90 |
| Do you have tooth or mouth problem that make it hard for you to eat? | 3.64 | -0.11 | -0.70 | 0.49 |
| Do you always have enough money to buy the food need? | 6.99 | 0.02 | 0.10 | 0.92 |
| Do you eat alone most of the time? | 4.08 | 0.08 | 0.49 | 0.63 |
| Do you take 3 or more different prescribed or over-the-counter drugs a day? | 3.61 | -0.21 | -1.17 | 0.25 |
| Without wanting to, do you have lost or gained 10 pounds in the last 6 months? | 5.83 | -0.08 | -0.44 | 0.66 |
| Are you always physically able to shop, cook, and/or feed yourself? | 12.60 | -0.08 | -0.16 | 0.87 |
| Shop yourself | 8.23 | 0.27 | 0.71 | 0.48 |
| Cook yourself | 10.14 | 0.06 | 0.23 | 0.82 |
| Feed yourself | -----** | -----** | -----** | -----** |

*p<0.10

**All of the participants were able to feed themselves at the time of interviews.

In the prediction of adequacy of food consumption from the determined scores, only the question about the consumption of eating fruits or drink fruit juices once or not at all daily showed a significant prediction (standardized beta=-0.34,

p=0.08<0.10), but not the consumption of vegetables two or fewer times daily

(standardized beta=0.05, p=0.82>0.10) or milk or milk products once or not at all

daily (standardized beta=0.31, p=0.15>0.10). The physical capability related to the

ability to shop, cook or feed themselves did not show any significant predictions

for the adequacy of food consumption.

The research results from the multiple regression indicated that the

modified DETERMINE Checklist asking the consumption of fruits, vegetables, and

milk products separately instead of integrated as one question in the standardized

DETERMINE Checklist showed a significant prediction of the inadequacy of food

consumption in fruits, but not in vegetables, or milk products among the Chinese

elderly participants. Therefore, the separated questions asking the inadequate

consumption of fruits, vegetables, and milk products from the modified

DETERMINE Checklist showed more information of food intake than the

standardized DETEREMINE Checklist.

The comparison between the number of the Chinese elderly participants

who reported number of "yes" from the modified DETERMINE Checklist and the

standardized DETERMINE Checklist on the questions related to the inadequate of

food consumption and physical capability are listed in Table 21. In the

standardized DETERMINE Checklist, there were thirty-two participants who

reported "yes" to the questions of whether inadequate food consumption was

related to nutritional health risks. In the modified DETERMINE Checklist, there

were four participants (13%) who reported that they had reported three "yes", eight

participants (25%) reported two "yes", and twenty participants (63%) reported one

"yes" to the questions related to inadequate food consumption. In the standardized

DETERMINE Checklist, there were nine participants who reported, "yes" to the

questions of whether they had nutritional health risks because of physical

incapability. In the modified DETERMINE Checklist, there were two participants

(22%) who reported two "yes" and seven participants (78%) reported one "yes" to

the questions related physical capability. The participants who reported two 'yes"

for the inability of physical capability were at greater nutritional health risk than the

participants who reported one "yes" in the modified DETERMINE Checklist.

**Table 21**
Comparison between the numbers of the Chinese elderly participants
(n=58) who reported "no" and "yes" to the food consumption
questions and the physical capability questions from the standardized
DETERMINE Checklist and the modified DETERMINE Checklist

| Food | The standardized DETERMINE Checklist | | | |
|---|---|---|---|---|
| Consumption | No | | Yes | |
| | 26 | | 32 | |
| | The modified DETERMINE Checklist | | | |
| | 0 "yes"(No) | 1 "yes" | 2 "yes" | 3 "yes" |
| | 26 | 20 | 8 | 4 |
| Physical | The standardized DETERMINE Checklist | | | |
| capability | No | | Yes | |
| | 49 | | 9 | |
| | The modified DETERMINE Checklist | | | |
| | 0 "yes" (No) | 1 "yes" | 2 "yes" | 3 "yes" |
| | 49 | 7 | 2 | 0 |

These research results showed that the standardized DETERMINE

Checklist was not able to distinguish the differences of nutritional risk level of food

consumption and physical capability between these participants. Therefore, the

modified DETERMINE Checklist showed more nutritional health risk indicators

information and the level of severity according to the participants who reported a

number of "yes" answers to the questions compared to the standardized

DETERMINE Checklist.

**Table 22**
Cross-tabulation analysis between the number of participants (n=58) of
adequacy level of food intakes and nutritional health risk levels according to the
Food Variety Score (FVS) and the standardized DETERMINE Checklist

| Food consumption | | Risk levels of standardized DETERMINE Checklist[1] | | |
|---|---|---|---|---|
| | | High risk | Moderate risk | No risk |
| | Poor diet | 0 | 0 | 0 |
| Adequacy level of food consumption of FVS[2] | Diet needs to improve | 2 | 3 | 2 |
| | Good diet | 12 | 21 | 18 |

[1]Risk level of the DETERMINE Checklist are the summed risk score at: 0-2, no risk;
3-5, moderate risk; 6 or above, high risk.

[2]Adequacy levels of food intakes are: FVS=<10, poor diet; 10<FVS<16, diet needs to
improve; FVS>=16, good diet.

The comparison of the adequacy levels of food intake according to the Food

Variety Score (FVS), and nutritional health risk levels according to the risk level of

the standardized DETERMINE Checklist from the cross-tabulation results are

listed in Table 22. Two participants were identified as at "high risk" and the "diet

needs to improve" where as twelve participants were identified as "high risk" but

were having a "good diet". Three participants were identified as at "moderate risk"

and with the "diet needs to improve", and twenty-one participants were at

"moderate risk" but with "good diet". Two participants were at "no risk" with "diet

needs to improve" and eighteen participants were "at no risk" and with "good diet."

Therefore, the sensitivity and specificity of the DETERMINE Checklist

were calculated from the research results show in Table 22 as follows: (1) the

sensitivity for detecting the Chinese elderly participants who were at "high risk"

with the "diet needs to improved"; and (2) the specificity of the DETERMINE

Checklist for determining the Chinese elderly participants who were at "moderate

risk" or "no risk" but with "good diet":

(1) Sensitivity (high risk with diet needs to improve) = 2 / (2+3) = 40%
Sensitivity (moderate risk with diet needs to improve) = 3/ (3+2) = 60%
(2) Specificity (moderate risk with good diet) = 21 / (12+21) = 63.6 %
Specificity (no risk with good diet) = 18 / (18+21) = 46.1 %.

This research results showed the sensitivity of the standardized DETERMINE

Checklist was poor (40% for people who were at high nutritional health risk, their

diet that need to improve, and 60% for people who were at moderate nutritional

risk, their diet needs to improve), and the specificity was also poor (63.6% for

people who were at moderate nutritional health risk with good diet, and 46.1% for

people who were at no nutritional health risk with good diet). Sensitivity and

specificity of a screening tool were always as trade-off. A screening tool should

generally with low sensitivity but high specificity, which were also reported by

Fletcer et al. (198). Additionally, these research results were not similar to the

report done by Posner et al. (133) among the white elderly population, which

indicated 41% and 85% of sensitivity and specificity of the standardized

DETERMINE Checklist. Therefore, the standardized DETERMINE Checklist was

neither sensitive nor specific to identify the nutritional risk status among the

Chinese elderly participants.

The comparison between the mean food intake for each food group and the

minimum recommendations from the U.S. Food Guide Pyramid (FGP) among the

Chinese elderly participants who were at different nutritional health risk levels are

listed in Figure 4. The minimum recommendations for each food group are 6

servings for grains, 3 servings for vegetables, 2 servings for fruits, 2 servings for

meat, and 2 servings for milk products. The nutritional health risk status was

identified by the DETERMINE Checklist for "no risk", "moderate risk", and "high

risk" levels. The participants (n=14) who were at high nutritional health risk

consumed on the average of 7.9 servings of grains, 5.6 servings of vegetables, 2.0

servings of fruits, 3.7 servings of meat, and 0.7 serving of milk products. The

participants (n=24) who were at moderate nutritional health risk consumed on the

average of 9.2 servings of grains, 4.4 servings of vegetables, 2.2 servings of fruits,

3.6 servings of meat, and 1.0 serving of milk products. The no risk participants

(n=20) consumed on the average of 7.7 servings of grains, 5.2 servings of
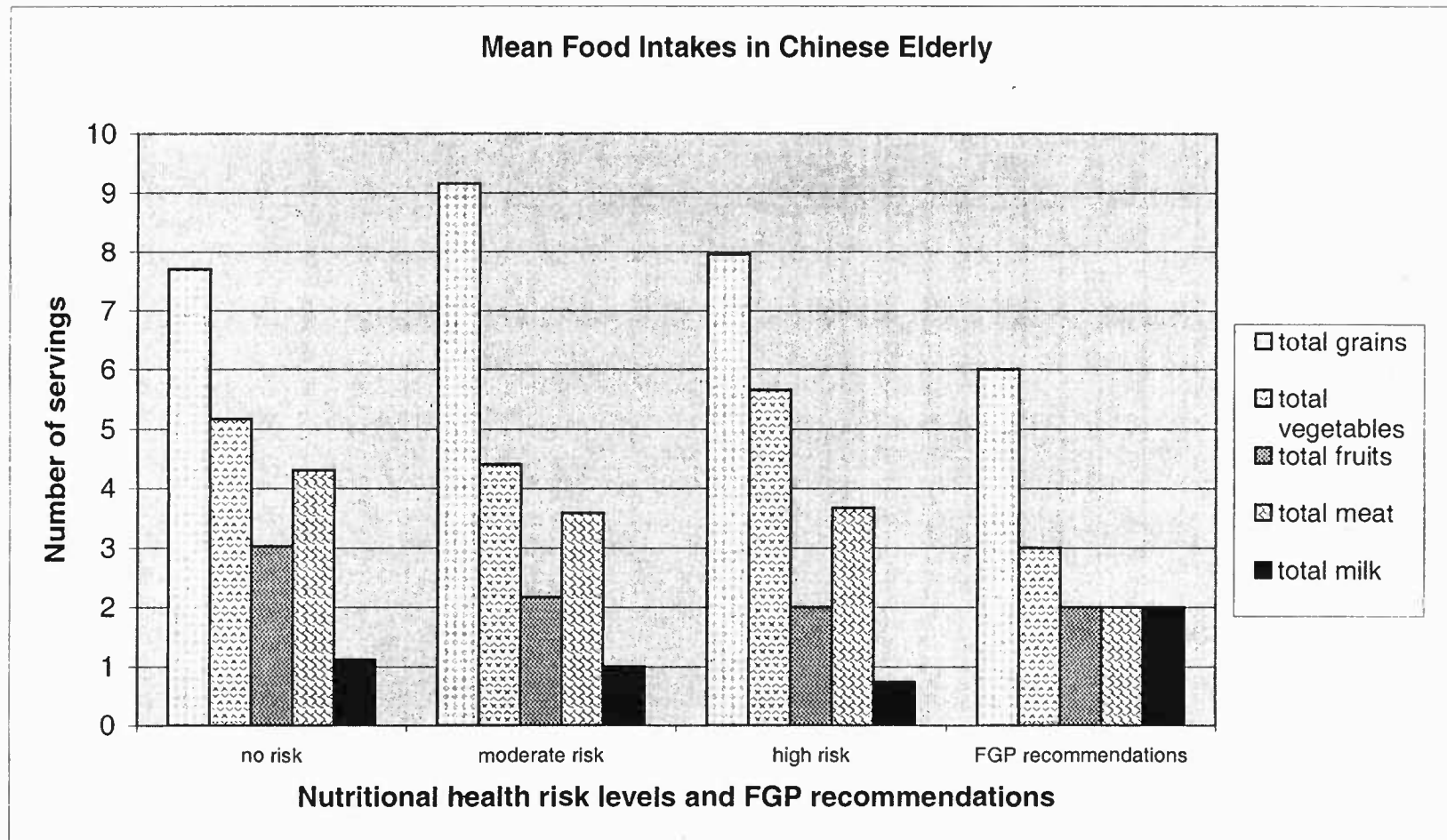
Figure 4. Comparison of mean food intakes for each food groups and the recommendations from the U.S. Food Guide Pyramid (FGP) in different nutritional health risk levels among the Chinese elderly participants (n=58)

vegetables, 3.0 servings of fruits, 4.3 servings of meat, and 1.1 servings of milk products. Among all of the Chinese elderly participants, regardless of the nutritional health risk status, their food intakes did not meet all the recommendations for all food groups. Therefore, the DETERMINE Checklist misidentified the Chinese elderly participants who were at "no risk", yet their food consumption did not meet the recommendations for all food groups according to the U.S. Food Guide Pyramid.

<center>Hypotheses Summary</center>

The research question of this case study was: Can a standardized nutrition screening tool identify the nutritional health risk status of Chinese elderly? The purposes of this study were; (1) to evaluate the nutritional health risk status among Chinese elderly; (2) to determine the adequacy of dietary intake among Chinese elderly using a dietary assessment method; and (3) to identify sensitivity and specificity of the nutritional health risk screening tool for Chinese elderly.

There were three null hypotheses for this study. The three null hypotheses were:

Ho1: The DETERMINE Checklist and Level I Screen in combination with 24- hour dietary recall cannot identify nutritional health risk indicators.

Ho2: Chinese elderly do not have adequate food intakes.

Ho3: Nutritional health risk status is not associated with the adequacy of

food intake.

The null hypothesis one (Ho1) was <u>rejected</u> according to the association

between the standardized DETERMINE Checklist and the Level I Screen, and

adequacy of food consumption determining by the Food Variety Score (FVS)

which were listed in Table 17 and Table 18. All of the questions from the

standardized DETERMINE Checklist failed to show significant association with

FVS. The eating of fruits or drinking of fruit juice once or not at all daily,

concerned about home security, and the usually or always needs assistance with

dressing from the Level I Screen showed a significant negatively association (r=-

0.30, p=0.3<0.10), a significant positively association (r=0.37, p=0.01<0.10), and a

significant positively association with the FVS (r=0.24, p=0.07<0.10). Therefore,

the Level I Screen did provide additional nutritional health risk indicators for

evaluating the adequacy of food consumption, but not the standardized

DETERMINE Checklist.

The null hypothesis two (Ho2) that stated Chinese elderly do not have

adequate food intake, was <u>accepted</u>. The research results showed there were

ninety-five percent (95th percentile) of male and female Chinese elderly participants

who consumed below the recommendations levels of intake for all the food groups

daily according to the U.S. Food Guide Pyramid (Figure 2 and Figure 3). In other

words, there were only five percent of the Chinese elderly males and female

participants whose daily food intakes met the recommendation of the U.S. Food

| Recruitment | Outreach of Elderly population:<br>• Churches<br>• Culture service center<br>• Advertisement in native language newspaper<br>• Elderly Nutrition Program, culture site<br>• Native language posters at cultural grocery stores and restaurants<br>• Invitation letters |
|---|---|

| Data Collection | Trained Interviewers:<br>• Bilingual<br>• Similar culture background to elderly<br>• Basic Nutrition Knowledge |
|---|---|

**The Modified DETERMINE Checklist**

The DETERMINE Checklist

Level I Screen

**24-hour Dietary Recall**

**Food Inventory List and Quantitative Cultural Food Photos**

Data Analyses

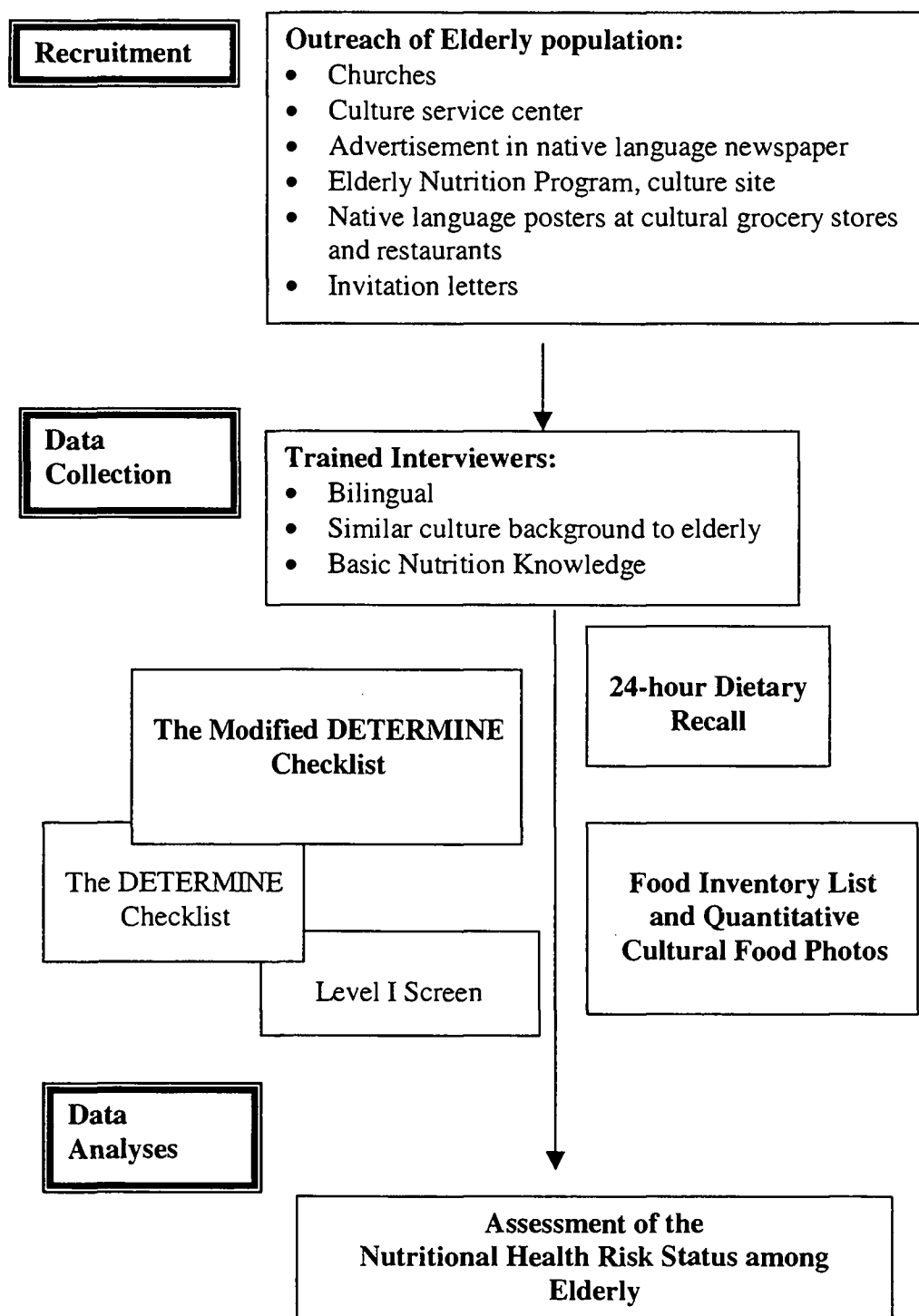**Assessment of the Nutritional Health Risk Status among Elderly**

Figure 5. The model for the assessment of nutritional health risk status among elderly minority populations.

inventory list and quantified food photos were used to assess the adequacy of food consumption and nutritional health risk status. The modified DETERMINE Checklist was adapted from the standardized DETERMINE Checklist and integrated with the Level I Screen. The model provides a standard nutrition screening process for assessing the nutritional health risk status among the Chinese elderly population and it can be implemented for this elderly population.

## Strengths and Limitations

The strengths of the study were: (1) compiling current nutritional health status information in Chinese elderly; (2) enhancing dietary assessment methods to evaluate the nutritional health status in Chinese elderly; (3) determining the sensitivity and specificity of nutrition screening tool for Chinese elderly; and most of all (4) implementing a culturally appropriate nutrition assessment process that could be the basis for nutrition assessment process of other elderly populations.

The limitation of the study was the generalizibility. The research results could not be generalized to other minority elderly populations, yet it provided base knowledge on the adequacy of food consumption and nutritional health risk status among the Chinese minority elderly population in western Oregon. The research method, face-to-face interviews, was time-consuming and costly. However, the face-to-face interview method did provide additional important informal comments when the elderly participants answered the questions. These comments could lead

to insight for future detailed qualitative studies in determining the risk factors

affecting the nutritional risk status among the Chinese elderly population.

CONCLUSIONS

The modified DETERMINE Checklist developed for this research was successful to assess of the nutritional health risk status among the Chinese elderly participants. The research results have answered the research question: Can standardized nutrition screening tools identify the nutritional health risk status of Chinese elderly? The three research null hypotheses were examined: (1) the DETERMINE Checklist and Level I Screen in combination with 24-hour dietary recall cannot identify nutrition health risk indicators. This null hypothesis was rejected; (2) Chinese elderly do not have adequate food intake. This null hypothesis was accepted; (3) nutritional health risk status is not associated with the adequacy of food intake. This hypothesis was accepted.

The recruitment of the Chinese elderly focus group and nutrition and health status interview participants was successfully achieved through the purposive and snowball sampling methods. Purposive sampling was used to recruit the specific cultural participants, and snowball sampling was achieved with the referrals from the contacts of the cultural organizations and the elderly participants. The diverse cultural recruitment locations in Oregon were the 30 miles radius from the cities of Portland, Beaverton, Salem, Corvallis, and Eugene, which provided a success of recruiting targeted population. Referrals from the religious leaders and friends of the Chinese elderly were the most successful ways of recruitments when the researcher was a "stranger" to the elderly individuals. Building the "bridge of

trust" was important prior to the acceptance of participation in the research interviews to receive accurate research information. Personal phone calls in which the caller spoke in the native Chinese Mandarin language were used to invite the elderly to participate in the research. This was one important way to increase the trust between the researcher and the potential participants prior to the interviews. An introduction of the researcher, including background information increased the acceptance of research participation. The fact that the interviewer was bilingual and had a similar cultural background increased the "bridge of trust" and provided a foundation for the similar cross-cultural experiences with the research participants.

The focus group interview time in the morning and the interview location which was arranged at an easily accessible local restaurant made the research data collection on the food inventory list successful. The interview time which was arranged in the morning and the location was chosen at an easily accessible local Chinese restaurant. Morning was the best time for all of the focus group participants (n=6) because they were either meeting with their friends or having other activities in the afternoon. The local restaurant was well known by all participants and was chosen to be the interview location. The food inventory list was successfully collected via the focus group research results.

**Focus group interview.** The research results from the focus group interview, the food inventory list and the Chinese food photos provided excellent outcomes to be used as the nutrition assessment tools. The food inventory list contained the

information on the food items that the Chinese focus group elderly (n=6) usually

consumed for breakfast, lunch, dinner, and snacks. The focus group interview was

a qualitative research approach that was intended to gather the information about

foods that the elderly usually consumed for daily three meals through their

discussions. The research results of the food inventory list indicated that

vegetables were consumed the most frequently and with the most variety, followed

by grains at both lunch and dinner. The vegetables consumed by the Chinese

elderly focus participants included both Asian vegetables, which were only

available in Asian food stores, and the vegetables, which were widely available in

the U.S. food stores. The Asian vegetables included the Chinese white cabbage

(Xiou Bie Ci), Chinese Chi (Giou Ci), and Chinese dried vegetables (Min Gan Ci).

The U.S. vegetables that were reported among the participants included tomatoes,

lettuce, cucumbers, carrots, and broccoli. The grains usually consumed among the

elderly focus group participants were rice and noodles. This list provided the

researcher with important information of the type of foods and in which food group

that the Chinese elderly living in the U.S. usually consumed for daily three meals.

The Chinese elderly participants adopted U.S. menu items and favored them

with the traditional Chinese food favoring to the menu items. Most focus group

Chinese elderly participants consumed both non-traditional Chinese menu items

with traditional Chinese food ingredients. For example, raw vegetables, such as

salads, were considered to be a non-traditional Chinese menu item, but sesame seed

oil was used as the salad dressing.

The food measuring units used by the Chinese elderly differed from the ones used by the general population. The accurate food measuring units are an essential factor for adequate food consumption assessment. The traditional Chinese food serving unit was a "bowl" instead of a "cup". The amount of one bowl was equal to one and a half cups. The majority of the food items for each food group were quantified by "cups" according to the U.S. Food Guide Pyramid. Knowing the conversion between the traditional Chinese food serving units and the U.S. food measuring units assisted the researcher in assessing the food consumption information accurately.

The Chinese food photos that were taken by the Chinese elderly focus group participants were not successful. Professional photographers provided a more effective and efficient way to develop the nutrition assessment tool, the quantitative Chinese food photos, than using the photos taken by the Chinese elderly focus group participants. Because the participants lacked of the experience in taking food photos or were unable to follow the written instructions of separating the food ingredients into one-serving sizes, therefore, the photos were unusable. The Chinese food photos taken by the participants were either underexposed, had a busy background, or the food ingredients were not in a one-serving size; thus, these photos were unable to be used as a nutrition assessment tool. As a result of the poor photos, a professional food photographer in cooperation with the researcher to provide better Chinese food photos. The professional food photographer collaborated with the researcher and followed the food inventory list and thereby

provided an effective and efficient way to develop an accurate culturally specific nutrition assessment tool, the Chinese food photos.

A pilot study was used successfully to evaluate the nutrition assessment tools, the Nutrition and Health Related Questionnaire (Appendix 7), and the face-to-face nutrition and health status interview process. The nutrition and health status interview duration was appropriate (averaged 32 minutes) and the food inventory list and Chinese food photos combined with American food models were very useful in assisting the Chinese elderly to recall the food items they consumed yesterday. The Chinese elderly pilot study participants (n=5) were confused about the "double-negative" questions from the Nutrition and Health Related Questionnaire, such as "never have not enough" were actually meant, "always have enough". However, with the verbal explanations from the researcher, the participants were able to understand the meaning of the questions during the face-to-face interviews.

The Chinese elderly women would not participate in providing their actual body weight. Self-reported weight and height were found to be the preferable vital measurements from the pilot study participants (n=5). Elderly women participants preferred to provide self-reported weights instead of being weighed. The self-reported weight was found to be highly correlated with actual body weight measurements (183). Therefore, self-reported weight and height were used as the measurements in the Nutrition and Health Related Questionnaire during the interviews.

**Nutrition and health status interviews.** An excellent participant pool was developed from the recruiting model. There were fifty-eight Chinese elderly age 70 or above participating in the nutrition and health status interviews. The participants were included some college and living in the city.

The English language incompetence of the Chinese elderly was not a barrier for the food consumption selection. The results showed that the research participants were more likely to live in the U.S. for more than ten years and to be the first generation living in the U.S. However, they were also more likely to require translators if they were interviewed in English and could not read or speak English when they went grocery shopping. Coping strategies of overcoming the inability of reading or speaking English language when they did the grocery shopping were reported to the researcher. By looking at the pictures on the food labels or through the clear food packaging, the Chinese elderly were able to shop for the foods they needed.

The Chinese elderly in the nutrition and health status interviews had positive attitudes even over though half of them (57%) had been told by their doctors or nurses that they had nutrition related chronic illnesses. The participants were more likely to rate their own health "excellent" (7%) or "very good" (48%) even when they had been told they had chronic illnesses by the doctors or nurses. Most of the nutrition-related chronic illness that the participants had been told they had were cancer, high blood pressure, heart disease, and diabetes. The traditional Chinese concept of "losing-face" affected the elderly participants because they did

not admit that their health status was "poor" even though they had a numbers of chronic diseases. The concept of using self-perceived health to predict mortality among the Chinese elderly could lead to the underestimation of the overall nutritional health risk among this population (200).

The adequacy of the food consumption in the Chinese elderly participants (n=58) was determined successfully by comparing the food intake to the recommended number of servings from the U.S. Food Guide Pyramid. The majority of the Chinese elderly participants had inadequate food consumption of milk products and it was because that milk is not traditionally part of Chinese diet. The majority (95%) of the participants did not meet the minimum recommended number of servings for all food groups. More Chinese elderly did not meet the recommendations for milk products than for meat, vegetables, fruits, and grains food groups. They also reported that they were more likely to consume Asian foods, which consisted of plenty of vegetables and grains, but not milk products. Therefore, the inadequacy of food consumption was mainly due to the low consumption of milk products.

The types of food items that the Chinese elderly participants ate were low-fat meat, high-fat milk, Asian vegetables, citrus fruits, and Asian staple grains. The participants were most likely to eat fish, followed by pork, as their meat consumption. Whole milk was the most popular kind of milk product. However, among those elderly participants who consumed a high amount of milk products, the low-fat milk was consumed more than the whole milk. Asian vegetables were

the most popular kind of vegetables and were consumed in the highest amounts followed by potatoes, dark green vegetables, tomatoes, and carrots. Citrus fruits were the most popular kind of fruits, followed by bananas. For the grain food group, rice was reported to be the most favorite kind, followed by noodles.

The snack food choices were not so healthy among the Chinese elderly participants, which was an adoption of the U.S. dietary habit. The participants were more likely to choose the added fat/sugars, grains, and fruits as snacks. Snacking was not considered a traditional Chinese dietary pattern, but it was an adoption of the U.S. dietary pattern. Adoption of the snacking habits and the types of snacks, the added fats/sugars and grains, can increase the total amount of fat and grain intakes among the participants.

The Level I Screen successfully provided additional nutritional health risk information compared to the standardized DETERMINE Checklist (Appendix 1). The questions from the Level I Screen regards to the "usually eating alone", "eating fruits, or drink fruit juice once or not at all daily", and "being concerned about home security" showed a significant influence on the adequacy of food consumption determined by the Food Variety Score (FVS). The FVS is the sum of the assigned scores for each food group times the total number of servings, which was reported among the participants. However, none of the questions from the standardized DETERMINE Checklist showed a significant association with the adequacy of food consumption. Therefore, the Level I Screen can provide more information on the nutritional health risk assessment.

The significant outcome of the factors affecting the adequacy of food consumption were the gender differences, language competency of requiring translator, taking nutrition supplements, having accessibility of Asian foods in the U.S., receiving government benefits, and having health insurance coverage showed significantly effects on the adequacy of food consumption among the Chinese elderly participants. The comments for the Chinese elderly participants were aware of the importance of nutrition and taking nutritional supplements to compensate poor appetite it was actually a barrier to adequate food consumption.

The Nutritional Risk Score (NRS) was used successfully to determine the nutritional health risk factors among the Chinese elderly participants. The significant factors affected the nutrition health risk status determined by the NRS were gender, English language competency, self-rated health status, want to know the research results, Body Mass Index (BMI), and the number of diseases the elderly participants had been told they had. The elderly women were also likely to have a higher BMI compared to the elderly men and had increased nutritional health risk. Increased number of diseases could lead to the increased nutritional health risk.

Receiving government benefits and having health insurance coverage were the risk factors to the adequacy of food consumption (determined by the Food Variety Score, FVS) and the nutritional health risk status (determined by the Nutritional Risk Score, NRS), which may not provide accurately research associations due to the confusion of the terminology among the Chinese elderly

participants. Confusion about the terminology for the government benefit programs, such as the "Elderly Nutrition Program" vs. "a place to receive free lunches," affected the accuracy of the research results. Simple descriptions of the government programs should provide better research results associated with the adequacy of food consumption or the nutritional health risk status.

The adequacy of food consumption was not related to the nutritional health risk status among the Chinese elderly participants. The adequacy of food intake was determined when the food consumption of the elderly met the recommendations for all food groups. The inadequacy of food consumption did not show a significant association with the nutritional health risk status. This was because large amount of vegetable, fruits, and grains were reported to be consumed by the participants. The sum of the Food Variety Score (FVS) increased from the results of the significant number of vegetables, fruits, and grains that were consumed regardless the milk product intake was less than the recommendations from the U.S. Food Guide Pyramid. Therefore, it did not show a significant association with the nutritional health risk status.

**Research assessment tool.** The modified DETERMINE Checklist developed from the research to assess the nutritional health risk status was more successful than the standardized DETERMINE Checklist. The modified DETERMINE Checklist asked about the inadequate food consumption of fruits, vegetables, and milk products, and the physical capability of shopping, cooking, or feeding oneself as six separate questions instead of two integrated questions in the standardized

DETERMINE Checklist. By asking the six separate questions, the modified DETERMINE Checklist can provide the levels of food consumption inadequacy of the detailed nutritional health risk information than the standardized DETERMINE Checklist.

The physical capability of shopping and cooking from the modified DETERMINE Checklist did not affect the FVS because informal comments from the Chinese elderly reported that "transportation" was the main concern instead of their physically capability to perform the activities. The Chinese reported that they were unable to drive or did not have drivers' licenses instead of having "physically capability," but the depended on their sons or daughters to take them to the store.

**Standardized DETERMINE Checklist.** The standardized DETERMINE Checklist was not useful to assess the Chinese elderly participants who had inadequate diets consumption ("diet needs to improve") and were identified at either "high" or "moderate" nutritional health risk. It also was not useful for assessing those who had adequate diets ("good" diet) and at "moderate" or "no" nutritional health risk. The efficacy of the standardized DETERMINE Checklist showed that the standardized DETERMINE Checklist had low sensitivity and specificity in identifying the nutritional health risk status for the Chinese elderly participants. The standard acceptance percentages for the nutrition screening test are ranging from 75% to 90%. The sensitivity from this research was 40% and 60% in determining the Chinese elderly who were at "high" or "moderate" nutritional health risk that were identified as "needing to improve their diets". The

specificity of assessing the Chinese elderly at "moderate" nutritional health risk with "good diet" was 63.6% and at "no risk" with "good diet" was 46.1%. The nutrition screening tool, the standardized DETERMINE Checklist, with low sensitivity and specificity cannot identify either the Chinese elderly who had inadequate food consumption and were at either high or moderate nutritional health risks, or identify the Chinese elderly whose diets were adequate and were at moderate or no nutritional health risk. The standardized DETERMINE Checklist, cannot prompt the Chinese elderly who may be at nutritional health risks to seek further assessment from health professionals in various areas.

**Research model.** The model (Figure 5) developed from the study for the assessment of nutritional health risk status can be implemented in the Chinese elderly population. Effective outreach to the elderly population who might be at nutritional risk was the most important initial stage. Bilingual trained interviewers with similar cultural backgrounds to the elderly individuals and basic nutrition knowledge contributed to the investigations of the nutritional health risk factors using the modified DETERMINE Checklist. Detailed 24-hour dietary recall accompanied with a cultural food inventory list and quantitative food photos can be used to evaluate the adequacy of food consumption. This model could be expanded to provide a standard nutrition screening process for assessing the nutritional health risk status among other elderly minority populations as well.

The success of the research model and research results provided the researcher the opportunity to evaluate the nutritional health risk status among the

Chinese elderly populations. Total research was completed within six months, which included three months of participant recruitment, two months of data collection, and one month of data analyses. The initial research process would be time-consuming and costly. However, the benefits of the research results, which can improve culturally specific nutrition assessment tools and nutrition screening processes would be invaluable.

## Recommendations

It is recommended that the research model should be implemented to test the assessment of the nutritional health risk status among other elderly minority populations. As the results of the model success from the research positive outcomes, this prototype model may also be beneficial in identifying the nutritional health risk status for other elderly minority populations.

Further studies on the evaluation of the adequacy of food consumption among the Chinese elderly according to the long-term dietary record, could provide more accurate information than short-term dietary recall. Multiple-day of averages of food consumption information would provide more accurate information to evaluate the adequacy of food intake among the participants. Large numbers of research samples with one-day food consumption data could provide adequate population food consumption study information, three-day food consumption including two weekdays and one weekend day recorded quarterly throughout the

year could provide the habitual food consumption information and prevent seasonal food availability variance among the research participants.

Investigations to identify the barriers and motivators of proper milk products consumption among the Chinese elderly participant would improve the Chinese elderly overall dietary quality. The inadequacy of food consumption of the Chinese elderly was more likely to result from the low consumption of milk products. Whole milk was favorable for more elderly participants where low-fat milk was the choice for those who drank a lot of milk. Nutritionists would need to provide effective educational materials for the benefits of increasing milk consumption for this population.

Detailed interactions of the acculturation, language competency, attitude and awareness of nutrition and health, receiving government benefits, and having health insurance coverage related to the variety of food consumption were needed among the Chinese elderly participants. The areas of the acculturation affecting the nutritional health status and the adequacy of food consumption are needed for further in-depth qualitative research for Chinese elderly population. Standardized acculturation measurements are also needed examine the effects on the dietary habits. Further studies on the English language incompetence resulted in the inability to read the nutrition information on the food labels affecting the food intake can provide more detailed information of nutrition education for the Chinese elderly living in the U.S. The investigations on the motivators of taking nutritional supplements and the barriers of seeking health professionals could provide

researchers information on the barriers of accessing to health care among the Chinese elderly population. Education on the correct terminology related to government benefit programs for elderly and a comparison between the elderly who were living with or without families with health insurance could give the researcher more detailed information related to the nutritional health risk factor.

Long-term research to study on the tendency of increased BMI among the population who had been living in the U.S. for more than ten years in relation to the incidences of chronic illnesses could lead to the insights of the nutritional health risk factors associated with food consumption. Increased BMI was reported among the Chinese elderly participants, especially among the women. Long-term follow up of the increased Body Mass Index (BMI) related to the incidences of chronic illnesses and the relationship with the food consumption data could be very profound for this population.

The cut-off points of the Food Variety Score (FVS) to determine the adequacy of food consumption needs to be further defined through a nationwide Chinese elderly population study. The Food Variety Score (FVS) used to determine the adequacy of food consumption indicated the majority (88%) of the Chinese elderly had a "good diet", which was attributed to the high intakes of fruits, vegetables, and grains which improved the total scores of the FVS. Only five percent of the Chinese elderly participants met the recommendations of the U.S. Food Guide Pyramid for all food groups. Inadequate food consumption of the Chinese elderly was most likely to result from the low consumption of milk

products.  More accurate cut-off points in determining the inadequacy of overall food consumption will be useful.

The determination of the cut-off points for evaluating the nutritional health risk levels from the modified DETERMINE Checklist would need to be done in the nationwide population study among the Chinese elderly.  Proper cut-off points can be used to determine by comparing the assessment of the adequacy of food consumption and the sensitivity of the modified DETERMINE checklist.  In addition, it is recommended that detailed nutrient database analyses are necessary to determine the Chinese elderly population had inadequate food consumption levels.

The accessibility of the electronic communication methods increases, the importance of the availability of the culture food photos increases.  Nutrition and health educators or professionals can access the cultural food inventory list and quantitative food photos from the World Wide Web (WWW) of the national nutrient databank to provide the nutrition education material or nutrition assessment tools for any populations.  Further efforts are needed in increasing the accessibility of various cultural food inventory lists and quantitative food photos. This resource is recommended to be developed as a national collaborated research project.

Research on the types and amounts of nutrition supplements taking by the Chinese elderly and the effects on the nutritional health status were recommended

for further study. Significant number of research participants reported taking

nutrition supplements daily. The type and amount of supplements can provide

additional nutrient needs for elderly population and it can affect the nutritional

health risk status. Therefore, further investigations on the impacts of the nutritional

supplements on the health status can provide more detailed information in

evaluating the nutritional health status.

## Summary

The fastest growth rate of Asian American elderly, including the Chinese

elderly, was at high nutritional health risk because of insufficient research data,

language barriers and lack of health care insurance addition to the aging process.

The dramatic increasing rate of the Asian American population in the Northwest

region of the United States, including the Asian American elderly, the Chinese

have grown and are projected to grow the fastest among the minority populations

until the 21$^{st}$ century. Insufficient research conclusions on nutrition assessment

methods and nutrition screening tools for the Asian Americans, including the Asian

American elderly, can prevent the public from being aware of the health problems

among this population. Research problems arose among the Asian populations

when results were reported as "others" or combined all of the Asian populations as

one group. Additionally, the Asian American elderly have also been identified as

one of the populations at high nutritional risk with the increased likelihood of

language barriers and lack of health insurance coverage compared to other minority populations in addition to the aging process.

General perceptions of Asian populations as the population "eating most healthily" and "having no health problems" could seriously mask the nutritional health risks among this population. Although, overall the U.S. Census data reflected that the health status of the Asian Americans was not at increased risks and the Oregon population data reported that Chinese and Japanese populations had better health status than other minority populations, yet the Chinese elderly were found with increased risks of heart disease, diabetes, and stomach and esophageal cancer than the total elderly population and the two major leading causes of death were still cancer and heart disease. More studies are needed to investigate the nutritional health risk factors affecting the nutritional health status among the Asian elderly populations.

Efficacious preventive health strategies, such as nutrition screening tools, can detect the directions and development of nutritional health risk factors. Simple and effective nutrition screening tools can benefit the population who are at the highest nutritional risk the most and have limited access to health care professionals, such as the Chinese elderly. Many studies have investigated the nutritional health risk status for the White elderly population using the standardized nutrition screening tool, the DETERMINE Checklist. The DETERMINE Checklist and Level I Screen are the nutrition screening tools which have been widely applied in the nutrition screening process developed by the members of three professional

associations, the American Academy of Family Physicians, the American Dietetic

Association, and the National Council on Aging, Inc. However, no study has been

done in evaluating the efficacy, the sensitivity and specificity, of using the

standardized nutrition screening tool, the DETERMINE Checklist, among the

Chinese elderly.

A culturally adequate nutrition assessment method was needed to evaluate

the adequacy of food consumption accurately and to determine the nutritional

health risk status among the Chinese elderly population. The dietary assessment

has been a useful nutrition evaluation method to identify the nutritional risk for

many populations. The food frequency questionnaire was identified as one of the

most valuable dietary assessment methods in evaluating habitual dietary patterns

among a population. A Chinese semiquantiative Dietary History Questionnaire for

assessing food consumption was developed by Lee et al. in 1994 (118). However,

it was limited to the availability of the food items geographically.

The question of the research case study was to investigate: Can the

standardized nutrition screening tool, the DETERMINE Checklist, determine the

nutritional health risk status among the Chinese elderly? The research purposes

were; (1) evaluate the nutritional health risk status among Chinese elderly; (2)

determine the adequacy of dietary intake among Chinese elderly using a dietary

assessment method; (3) identify the sensitivity and specificity of the nutritional

health risk screening tool for Chinese elderly. There were three null hypotheses for

this study; Ho1: The DETERMINE Checklist and Level I Screen in combination

with 24- hour dietary recall cannot identify nutritional health risk indicators; Ho2: Chinese elderly do not have adequate food intake; Ho3: Nutritional health risk status is not associated with the adequacy of food intake.

This research study consisted of two parts: (1) the development of nutrition assessment tools including a focus group interview and a pilot study; and (2) nutrition and health status interviews. In the development of nutrition assessment tools, the focus group interview (n=6) was to generate culturally sensitive visual aids, the food inventory list and quantitative Chinese food photos, which were used to assess the adequacy of food consumption among the Chinese elderly in the following pilot study and nutrition and health status interviews. The pilot study (n=5) was to evaluate the nutrition and health status interviews process and readability of the Nutrition and Health Related Questionnaire, which were used in the nutrition and health status interviews. In the nutrition and health status interviews (n=58), the adequacy of food consumption of the Chinese elderly participants and the efficacy of the standardized DETERMINE Checklist were examined. The evaluation of the adequacy of food consumption was compared to the U.S. Food Guide Pyramid recommendations determined by Food Variety Score (FVS). The FVS was the sum of the assigned scores for each food group times the total number of servings that were consumed. The efficacy (the sensitivity and specificity) of the standardized DETERMINE Checklist was examined by comparing the adequacy of food consumption determined by FVS and the nutritional health risk levels identified by the standardized DETERMINE

Checklist. The Nutrition and Health Related Questionnaire included a dietary assessment, 24-hour dietary recall, and the modified DETERMINE Checklist. The modified DETERMINE Checklist was developed from the modification of the standardized DETERMINE Checklist and ask the integrated multi-aspect questions in separate questions. Additional nutrition-related risk factors, such as demographic characteristics, acculturation, language competency, and attitude and awareness of nutrition and health were also included in the questionnaire. Accessibility to Asian foods, receiving government benefits, health insurance coverage, and health status were included the questionnaire to assess the nutritional health risk indicators among Chinese elderly.

Sixty Chinese elderly age 70 or older living in their own homes or apartments were invited to participate in the research. Participant recruitment locations were selected in the 30 miles radius of Oregon cities, Portland, Beaverton, Salem, Corvallis, and Eugene. Purposive and snowball sampling methods were used to recruit the specific cultural research participants and referrals from various initial contacts. The initial contacts were through the leaders of Chinese churches, coordinators of the cultural organizations, directors of senior centers, cultural service center, owners of Asian and non-Asian restaurants, and advertisement in a local newspaper. Research invitation letters were sent out to those initial contacts and followed by personal invitation phone calls by the researcher.

The greatest challenge of the study was the recruitment of the Chinese elderly participants. The nature of the traditional Chinese culture, sense of trust

and self-care, were the important barriers to the Chinese elderly to become involve

the participation in the research. Therefore, interviewers shared similar native

Chinese languages and/or culture backgrounds in combination with introductory

conversation about the interviewer's background information related to the research

prior to the interviews could enhance the closeness and trust from the participants.

This method increased the likelihood of the Chinese elderly willingness to

participate in the research.

The food inventory list and Chinese food photos were developed from the

focus group interview and used as visual aids to determine the adequacy of food

consumption during the 24-hour dietary assessment in the pilot study and the

nutrition and health status interviews among the Chinese elderly participants.

Visual aids for dietary assessment were important to increase the accuracy of

interview participants reporting the type and amount of food they consumed in the

previous day. The food inventory list included a list of commonly eaten foods for

breakfast, lunch, dinner, or snacks among the participants. The Chinese food

photos visualized the quantitative commonly eaten Chinese foods in the color

photos, which were successfully developed by the professional photographers

instead of from the focus group participants. These visual aids provided a memory

recall for elderly people who may have memory troubles in recalling previously

eaten food items during the dietary assessment.

The food inventory list reflected that the Chinese elderly maintained

traditional Chinese dietary habits, such as consuming various vegetables and grains

at both lunch and dinner combined with the adoption of the U.S. dietary habits, such as consuming convenience pre-packaged frozen dinners. Researcher familiarity with the culturally sensitive food serving unit amplified the accuracy of dietary assessment. For example, the traditional Chinese food-serving unit is "bowls" which is one and a half times more than the U.S. serving unit, "cups". Knowing the exchange between "bowls" and "cups" decreased the confusion during the dietary assessment interviews, and increased the accuracy of evaluation for food consumption recording.

The pilot study evaluated the readability of the Nutrition and Health Related Questionnaire and the nutrition and health status interview process. The quantitative food photos were successfully used to assess the food consumption information among the Chinese elderly participants, except the Chinese herbs. The Chinese herbs, which were not commonly consumed, were excluded in the food consumption analyses. The questions from the modified DETERMINE Checklist were able to identify the nutritional health risk status with the researcher's verbal explanations during the face-to-face interviews. Self-reported weight and height were the favorable measurements among the participants and were used as the vital assessment methods in the nutrition and health status interviews.

Data analyses were accomplished with the aids of the statistic software package, the Social Sciences version 7.5 (SPSS® 7.5) for Windows 98 (176). The results of each question from the Nutrition and Health Related Questionnaires were coded with a named variable, according to the code book developed by the

researcher. The code book included the name of the variables and the descriptions of the definitions of the values for each variable corresponding to each question. Independent variables in the study were demographics, acculturation, attitude and awareness to nutrition and health, English language competency, Asian food accessibility, whether the person was receiving government benefits, insurance coverage, and health status. The frequency of the independent variables as well as the associations between independent variables and nutritional health risk levels, and the associations between independent variables and the adequacy of food intakes were examined. The Pearson correlation were used to examine the relationship and t-test and Analysis of Variance were used to compare the means between the questions from the standardized DETERMINE Checklist and the Level I Screen with FVS. Multiple regression analysis was used to identify which questions in the modified DETERMINE Checklist predicted the adequacy of food intake.

Research results of the nutrition and health status interviews found that the overall inadequate food consumption of the Chinese elderly for both men and women, as compared to the recommendations of the U.S. Food Guide Pyramid and the null hypothesis 2, the Chinese elderly do not have adequate food consumption, was accepted. The Chinese elderly nutrition and health status participants (n=58) were more likely to be between the ages of 70-79, have some college education, and living in the city. They were more likely to be the first generation and had lived in the U.S. for more than ten years. More elderly Chinese men met meat and

vegetables recommendations than the elderly Chinese women. Fruits and grains were equally popular among both the men and women. Milk products were the least popular type of food items for both genders. And there were only five percent of Chinese men or women met their minimum recommendations for all food groups according to the U.S. Food Guide Pyramid. Various Chinese dishes were cooked as the mixed menu dishes combined vegetables and meats and were usually consumed with rice. This contributed to the increased consumption of meat, vegetables with grains food groups. The types of foods for each food group that the participants chose to eat showed that the majority of the participants consumed Asian vegetables. Fish was the first choice of meat, which was easily accessible because of the geographic location near the coast. Citrus fruits and rice or noodles were reported as popularly consumed among the participants. However, a significant amount of added fats/sugars was also reported in the food intakes and it was the most popular type of snacks for the Chinese elderly.

Language competency was not the barrier to the adequacy of food consumption. Coping strategies such as looking through the clear packaging of the foods, or the pictures of foods on the labels did not require language skill. However, reading the information from the food labels of the macronutrients and micronutrients required much more English language skills.

The effects of language competency the attitude and awareness of nutrition were related to the variety of the food consumption and nutritional health risk. Require translator or not showed a significant effect on the adequacy of food

consumption. Taking nutritional supplements and wants to know the research result were also shown significant effects on the food variety consumption. Self-rated health was inversely associated with the nutritional health risk status. Accessibility of the Asian foods was the additional factor that was related to the food consumption. Using nutritional supplements to compensate the poor appetite instead of seeking the assistance from health professionals and the "losing-face" of admitting their poor health status affected their food consumption and nutritional health status.

Receiving the government benefits and having health insurance affected both the nutritional health risk status and the food varieties of consumption. However, many research participants were interviewed at the Elderly Nutrition Program Asian Meal sites after eating the lunch and had reported that they did not participate in the Elderly Nutrition Program. The terminology was unknown to them. Additionally, the researcher had to explain the differences of "Medicare" and "health insurance" during the interviews. Unfamiliar the terminology for government benefit programs contributed the reasons of causing the confusion with some of the participants. Simple descriptions about the government programs would provide more clarity for the questions.

The gender differences, Body Mass Index (BMI), and the number of diseases the participants had, were shown to be the factors affecting the nutritional health risk status. The Chinese elderly women were likely to have increased nutritional health risk compared to the Chinese elderly men. Chinese elderly who

had increased BMI increased their nutritional health risk. The participants had increased the number of chronic illness were also more likely to have increase nutritional health risk.

The Level I Screen provided additional nutritional health risk information on the usually eating alone, inadequate of fruits consumption, and concerning about home security which were the risk factors affecting the adequacy of food consumption. However, none of the questions from the standardized DETERMINE Checklist showed any effects on the adequacy of food consumption. All of the questions from the standardized DETERMINE Checklist determined by the Food Variety Score (FVS) did not identify significant differences between participants their FVS. Therefore, this research results showed that the null hypothesis 1 (Ho1), the DETERMINE Checklist and Level I Screen in combination with 24- hour dietary recall cannot identify nutritional health risk indicators, was rejected.

The efficacy of the standardized DETERMINE Checklist was calculated using the standards of sensitivity and specificity. The results showed that the standardized DETERMINE Checklist was not sensitive nor was specific in evaluating the nutritional health risk status for the Chinese elderly participants. The standardized DETERMINE Checklist was not a very specific (63.6% and 46.1%) identifying the participants who had "good diet" and were at "moderate" or "no" nutritional health risk. It was also not sensitive (40% and 60%) identifying the participants whose diets "needed to improve" and at "high" or "moderate" nutritional health risk among the Chinese elderly. The standardized

DETERMIENE Checklist, cannot prompt the Chinese elderly participants who may be at nutritional health risks to seek for further assessment from health professionals in various areas.

The adequacy of food consumption was not related to the nutritional health risk status among the Chinese elderly participants, the null hypothesis 3 (Ho3), the nutritional health risk status is not associated with the adequacy of food consumption, was accepted. The inadequacy of food consumption did not show a significant association with the nutritional health risk status. This was because large amount of vegetable, fruits, and grains was reported and consumed among the participants. The sum of the Food Variety Score (FVS) increased as the results of the significant number of vegetables, fruits, and grains that were consumed regardless the milk products intake were less than the minimum recommendations from the U.S. Food Guide Pyramid. Therefore, the participants had a high FVS, but they were at nutritional health risk.

The modified DETERMINE Checklist identified the level of severity of the Chinese elderly participants compared to the standardized DETERMINE Checklist. The modified DETERMINE Checklist developed from the research provided more nutritional health risk information with separated questions asking about the adequacy of food consumption and physical capability instead of integrated questions in the standardized DETERMINE Checklist. The modified DETERMINE Checklist were able to show the participants had different levels of the inadequate food consumption for the fruits, vegetables, and milk products, and

physical inability to shop, cook or feed themselves. Therefore, the modified

DETERMINE Checklist compared to the standardized DETERMINE Checklist, the

modified DETERMINE Checklist were able to identify the levels of nutrition al

risks.

A prototype research model was developed by the researcher from this

study and used to assess the nutritional health risk status of the Chinese elderly

minority populations. This model was implemented for the evaluation the

nutritional health risk status among the Chinese elderly using outreach avenues for

the population. Bilingual trained interviewers were used to assess the nutritional

health status using the modified DETERMINE Checklist and culturally specific

visual aids, the food inventory list and Chinese food photos. The culturally specific

visual aids were used to evaluate the adequacy of food consumption during a

dietary assessment process, the 24-hour dietary recall. The nutritional health risk

status of the Chinese elderly was identified through this process of the research

model.

Research results indicated several recommendations for future studies.

Recommendations were: (1) implementation of the research model in the

assessment of the nutritional health risk status among other elderly minority

populations; (2) evaluation of the food consumption adequacy information based

on long-term dietary records; (3) identification of the barriers and motivators for

increasing milk consumption; (4) additional qualitative studies were needed on

nutritional health risk factors, acculturation, language competency, attitude and

awareness of nutrition and health, and accessibility of cultural foods affecting the nutritional risk status and food variety consumption among the Chinese elderly population. (5) long-term effects of increased Body Mass Index (BMI) related to the incidences of chronic diseases and the factors related to the increased BMI would allow nutrition educators to develop adequate nutrition material for this population; (6) development of accurate cut-off points for evaluating the adequacy of food consumption determining by the Food Variety Score and the nutritional health risk status using the modified DETERMINE Checklist on a nationwide population study; (7) Discontinue the use of the standardized DETERMINE Checklist and replace it with the modified DETERMINE Checklist for the Chinese elderly population; (8) development of a widely accessible comprehensive nutrient databank on the World Wide Web (WWW) including the commonly eaten multi-cultural food inventory lists and the quantitative food photos, which can offer the educational materials or culturally sensitive nutrition assessment tools for the nutritionists nationwide.

Culturally appropriate nutrition screening tools and assessment methods are essential to provide an effective and accurate evaluation process of nutrition risk status results for any populations who are at nutritional risk. Nutrition professionals would need to prepare themselves for the increasing needs in the arena of risk factors associated with the nutritional risks for the population. And further direct the populations who are at nutritional risk adopt healthy eating habits in culturally appropriate sensible ways.

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# APPENDICES

Appendix 1

The DETERMINE Checklist and Level I Screen

(Reprinted with permission by the Nutrition Screening Initiative, a project of the American Academy of Family Physicians, the American Dietetic Association and the National Council on the Aging, Inc., and founded in part by a grant from Ross Products Division, Abbott Laboratories)

*The Warning Signs of poor nutritional health are often overlooked. Use this checklist to find out if you or someone you know is at nutritional risk.*

# DETERMINE YOUR NUTRITIONAL HEALTH

Read the statements below. Circle the number in the yes column for those that apply to you or someone you know. For each yes answer, score the number in the box. Total your nutritional score.

|  | YES |
|---|---|
| I have an illness or condition that made me change the kind and/or amount of food I eat. | 2 |
| I eat fewer than 2 meals per day. | 3 |
| I eat few fruits or vegetables, or milk products. | 2 |
| I have 3 or more drinks of beer, liquor or wine almost every day. | 2 |
| I have tooth or mouth problems that make it hard for me to eat. | 2 |
| I don't always have enough money to buy the food I need. | 4 |
| I eat alone most of the time. | 1 |
| I take 3 or more different prescribed or over-the-counter drugs a day. | 1 |
| Without wanting to, I have lost or gained 10 pounds in the last 6 months. | 2 |
| I am not always physically able to shop, cook and/or feed myself. | 2 |
| **TOTAL** | |

## Total Your Nutritional Score. If it's —

**0-2** **Good!** Recheck your nutritional score in 6 months.

**3-5** **You are at moderate nutritional risk.** See what can be done to improve your eating habits and lifestyle. Your office on aging, senior nutrition program, senior citizens center or health department can help. Recheck your nutritional score in 3 months.

**6 or more** **You are at high nutritional risk.** Bring this checklist the next time you see your doctor, dietitian or other qualified health or social service professional. Talk with them about any problems you may have. Ask for help to improve your nutritional health.

*These materials developed and distributed by the Nutrition Screening Initiative, a project of:*

AMERICAN ACADEMY OF FAMILY PHYSICIANS

THE AMERICAN DIETETIC ASSOCIATION

NATIONAL COUNCIL ON THE AGING. INC.

**Remember that warning signs suggest risk, but do not represent diagnosis of any condition. Turn the page to learn more about the Warning Signs of poor nutritional health.**

# Level 1 Screen

## Body Weight

Measure height to the nearest inch and weight to the nearest pound. Record the values below and mark them on the Body Mass Index (BMI) scale to the right. Then use a straight edge (ruler) to connect the two points and circle the spot where this straight line crosses the center line (body mass index). Record the number below.

Healthy older adults should have a BMI between 24 and 27.

Height (in):_____
Weight (lbs):_____
Body Mass Index:_____
(number from center column)

Check any boxes that are true for the individual:

☐ Has lost or gained 10 pounds (or more) in the past 6 months.

☐ Body mass index <24

☐ Body mass index >27

For the remaining sections, please ask the individual which of the statements (if any) is true for him or her and place a check by each that applies.

### NOMOGRAM FOR BODY MASS INDEX
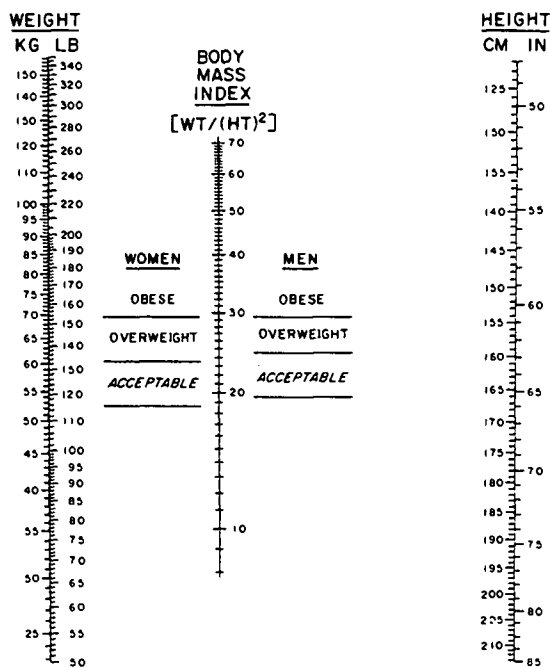
WEIGHT
KG  LB

BODY
MASS
INDEX
$[WT/(HT)^2]$

HEIGHT
CM  IN

WOMEN

MEN

OBESE

OBESE

OVERWEIGHT

OVERWEIGHT

*ACCEPTABLE*

*ACCEPTABLE*

© George A Bray 1978

## Eating Habits

☐ Does not have enough food to eat each day

☐ Usually eats alone

☐ Does not eat anything on one or more days each month

☐ Has poor appetite

☐ Is on a special diet

☐ Eats vegetables two or fewer times daily

☐ Eats milk or milk products once or not at all daily

☐ Eats fruit or drinks fruit juice once or not at all daily

☐ Eats breads, cereals, pasta, rice, or other grains five or fewer times daily

☐ Has difficulty chewing or swallowing

☐ Has more than one alcoholic drink per day (if woman); more than two drinks per day (if man)

☐ Has pain in mouth, teeth, or gums

**A physician should be contacted if the individual has gained or lost 10 pounds unexpectedly or without intending to during the past 6 months. A physician should also be notified if the individual's body mass index is above 27 or below 24.**

## Living Environment

☐ Lives on an income of less than $6000 per year (per individual in the household)

☐ Lives alone

☐ Is housebound

☐ Is concerned about home security

☐ Lives in a home with inadequate heating or cooling

☐ Does not have a stove and/or refrigerator

☐ Is unable or prefers not to spend money on food (<$25-30 per person spent on food each week)

## Functional Status

Usually or always needs assistance with (check each that apply):

☐ Bathing

☐ Dressing

☐ Grooming

☐ Toileting

☐ Eating

☐ Walking or moving about

☐ Traveling (outside the home)

☐ Preparing food

☐ Shopping for food or other necessities

If you have checked one or more statements on this screen, the individual you have interviewed may be at risk for poor nutritional status. Please refer this individual to the appropriate health care or social service professional in your area. For example, a dietitian should be contacted for problems with selecting, preparing, or eating a healthy diet, or a dentist if the individual experiences pain or difficulty when chewing or swallowing. Those individuals whose income, lifestyle, or functional status may endanger their nutritional and overall health should be referred to available community services: home-delivered meals, congregate meal programs, transportation services, counseling services (alcohol abuse, depression, bereavement, etc.), home health care agencies, day care programs, etc.

Please repeat this screen at least once each year--sooner if the individual has a major change in his or her health, income, immediate family (e.g., spouse dies), or functional status.

# NUTRITION
# SCREENING
# INITIATIVE
### A VITAL SIGN OF AMERICA'S HEALTH ™

1010 Wisconsin Avenue, NW    Suite 800    Washington, DC 20007    202/625-1662

April 30, 1998

WenYen Juan
Department of Nutrition and Food Management
Milam 108
Oregon State University
Corvallis, OR 97331

Dear Ms. Juan:

Per your request, we are pleased to grant you permission to reprint the following in the upcoming research questionnaire:

- *DETERMINE checklist*
- *Level I Screen*

All information must be credited as follows: "Reprinted with permission by the Nutrition Screening Initiative, a project of the American Academy of Family Physicians, the American Dietetic Association and the National Council on the Aging, Inc., and funded in part by a grant from Ross Products Division, Abbott Laboratories."

Please send me a final copy of the research questionnaire when it is finished. If you have any questions, feel free to contact me at (202) 625-1662.

Sincerely,

David Lee

AMERICAN ACADEMY OF FAMILY PHYSICIANS    THE AMERICAN DIETETIC ASSOCIATION    NATIONAL COUNCIL ON THE AGING, INC.

Initiative funded in part through a grant from Ross Products Division, Abbott Laboratories

Appendix 2

An Example of Research Invitation Letters and Follow-up Letters

An Example of the Invitation Letter

Oregon State University
Department of Nutrition and Food Management
Milam Hall 108
Corvallis, OR 97331
(541) 737-3561

July 1, 1999

The Office of Minority Health
800 NE Oregon, Suite. 950
Portland, OR 97232
(503) 731-4019

Dear Sir/Madam:

As a member of a government health agency for minority groups, such as Asian Americans, you may have noticed that Asian Americans and Asian American elderly have been the fastest growing populations in the United States, especially in the northwest region. This population will continue to experience the highest growth rate until the year 2025. However, knowledge on nutrition screening among the Asian American elderly is very limited

You are one of the most important community organizations serving the Asian American populations. I would like to take this chance to explain my research project: "Nutrition Screening in Asian American Elderly" among the Asian American elderly population. My study is designed to evaluate the adequacy of food intake and nutritional risk status among Asian American persons age 60 or older living in the northwest areas of Oregon. Identified Asian American elderly will be invited to participate in this nutrition screening research project during one initial contact and two follow-up contacts.

The identified elderly individual will be invited to participate in either a one-hour focus group interview or a 20- to 30-minute verbal face-to-face interviews. In the focus group interview, the participant will be asked about their commonly eaten foods for breakfast, lunch, dinner, or snacks. They will receive two one-time use cameras with a postage paid envelop, an explanation sheet of one serving size of foods, and be trained how to take food photos. The elderly person will be asked to use the cameras and take the food photos, and mail them back in the postage paid envelop to the researcher. In the 20- to 30-minute verbal face-to-face interview, the participant will be asked to answer a Nutrition and Health Related Questionnaire including two major parts: (1) a twenty-four hour dietary recall is used to record the amount of foods consuming in the previous 24-hour period of time; (2) the nutritional health risk questions include nutrition screening tools: the

DETERMINE checklist and Level I Screen. These two screening tools are used to identify nutritional health risks among the elderly. In addition, demographic questions, acculturation, attitude towards nutrition and health, health status, awareness of nutrition, accessibility of cultural foods, and receiving government benefit or health insurance, will also be included in the verbal interview questionnaire. Weight and height will be measured using a weight scale and a Frankfort horizontal plane for ambulatory elderly participants. Knee height will be measured for estimating the height for ambulatory elderly who can not stand up straight.

Potential benefits of the research results include: (1) a simple and effective nutrition assessment tool may be used to evaluate nutrition risk status among Asian American elderly because this population group is less likely to seek health professionals and/or to have health insurance coverage; (2) increased self-awareness of participants' nutritional status; (3) additional nutrition-related risk factors may be identified among this population. Those risk factors can be used to predict nutritional risk status among Asian American elderly. Furthermore, nutritional intervention can be done to prevent severe deterioration. In addition, the focus group participants will receive a copy of color food photo in an album as the incentive for participating in the research.

Participants will be invited to participate in this study which is completely voluntary, and they can either participate or withdraw from the study at any time. Any information obtained from the participants will be kept confidential. An identification number will be used to identify any information that participants provide in order to evaluate the research results. The only persons who will have access to this information will be the investigators, and no names will be used in any data summaries or publications.

However, locating of Asian American elderly participants is very difficult without your assistance. Please respond to this letter with the enclosed postage paid envelope. If you or prospective participants have any questions about the research study and/or specific procedures, please contact me at (541) 737-3561 or juanw@ucs.orst.edu.

Thank you very much for your assistance.

Sincerely,

WenYen Juan
Department of Nutrition and Food Management
Milam Hall 108
Corvallis, OR 97331
juanw@ucs.orst.edu
(541) 737-3561

An example of One Week Follow-Up Letter in English

Dear                    :

Last week, during a focus group, two one-time use cameras were distributed to you for the purpose of taking pictures of your most commonly eaten foods daily.

If you have already taken pictures of your commonly eaten food items and returned the cameras, please accept our sincere thanks. If not, please do so. We are especially grateful for your help because we believe your response will be very useful to policy makers and public officials.

If you have any questions, please call us at (541) 737-3561.

Sincerely,

WenYen Juan
Nutrition and Food Management
Oregon State University
Corvallis, OR 97331

Appendix 3

English and Chinese Advertisement for

Recruiting Research Interview Participants

# Advertisement for Recruiting Research Interview Participants

**Are You Interested in Knowing Your Nutritional Health Status?**

I am a doctoral student in Oregon State University. My study is designed to evaluate the adequacy of food intakes and nutritional health status among Chinese elderly persons age 70 or older living in 30 miles radius from the cities of Portland, Beaverton, Salem, Corvallis, and Eugene.

**I am looking for the participants who are:**

- ·Chinese, and;
- Age 70 or older, and;
- Living in houses or apartments

**You will be invited to participate in a personal face-to-face verbal interview.**

- Personal face-to-face interview: will take about 20 to 30 minutes using a Nutrition and Health Related Questionnaire. The participants will be asked to answer a Nutrition and Health Related Questionnaire including two major parts: (1) twenty-four hour dietary recall is used to record the amount of foods consuming in the previous 24-hour period of time; (2) the nutritional health risk questions include the questions about some risk factors related to your nutritional health.
- You will receive a personalized nutrient analysis if you participate in the research.
- I will provide translator for you during the interview if you wish.
- Participating in this study is completely voluntary, and you can withdraw from the study at any time.
- Any information obtained from the participants will be kept confidential. An identification number will be used to identify any information you have provided to evaluate the research results. The only person who will have access to the information will be the primary investigators and no names will be used in any data summaries or publications.

**If you have any questions about the research study and/or specific procedures, please feel free to contact WenYen Juan at the address: Dept. of Nutrition and Food Management, Oregon State University, Milam Hall 108, Corvallis, OR 97331; my phone number is: (541) 757-6680, or Alison at (503) 635-3529.**

## 您想要知道您的營養健康狀況嗎???

我是奧立岡州立大學的博士學生。我的博士論文研究目標是衡量住居美國的中國老年人的飲食均富及營養健康狀況。

如果您是 :
- 中國人，及;
- 年齡 70 到 90 歲，及;
- 住居在美國，或 ;
- 目前住居在波特蘭 (Portland)、比博頓 (Beaverton)、沙蘭 (Salem)、可發市(Corvallis) 或 猶京(Eugene)。

我極力邀請您參加團體面談或是個人面談於我的博士論文研究。

- 團體面談: 參加的人將會要求簽署個人通知表，考員版在面談之後，將會寄給與本人。總共有六個人可一起參加團體面談一小時。面談時討論個人平時三餐或零嘴的飲食食物。面談之後，每人將會指示使用方便式相機拍攝在團體面談時討論的食物，相機會要求在一個月內寄回。

  - 您將會得到一本相簿以及您拍攝的照片做爲參加研究獎勵。

- 個人面談: 參加的人將會要求簽署個人通知表。考員版在面談之後，將會寄給與本人，個人面談大約 20 到 30 分鐘。面談時，訪問有關於飲食均富及營養健康狀況的問題: (1) 24 小時內所有吃的食物; (2) 營養健康狀況的問題 ("決定調查表" 及 "一級營養評估")。身高和體重一並會計錄。

  - 您將會得到個人飲食分析做爲參加研究獎勵。

- 我會提供中文翻譯員。
- 參加此研究完全出於自願，您可隨時終止。
- 任何從您得到的消息，將會保持避秘，只有指示號碼會被使用來評估研究結果。除了主任研究員，沒有任何人可拿到資料，也沒有任何人的名字會被使用。

如果您有任何問題有關於此研究或是步驟，
請洽阮文岩，電話號碼: (541) 757-6680 或是 網路地址 juanw@ucs.orst.edu

Appendix 4


A List of Selected Contacting Addresses of Chinese Service Agency, Senior
Nutrition Program and Centers, Cultural Organizations, Student Associations, and
Cultural Grocery Stores and Restaurants

Minority Health Agencies:

  The Office of Minority Health
  800 NE Oregon
  Ste. 950
  Portland, OR 97232
  (503) 731-4019

Senior Nutrition Program and Agencies:

  Clackamas County
  Nutrition Program-Meals-on-Wheels
  5440 SE Kellogy Ck R.
  Milwaukee, OR
  (503) 654-3030

  Multnomah County
  Aging Service Department
  421 SW 5th St.
  Portland, OR
  (503) 248-3620

  Washington County
  Beaverton Senior Resource Center
  4805 SW Griffin Dr., Suite A
  Beaverton, OR
  (503) 643-2322

  Hilsboro Senior Resource Center
  133 SE Second Ave.
  Hillsboro, OR
  (503) 693-0999

Area Agency on Aging
(503) 655-8640

Eugene City of Senior Center:

  Campbell Senior Center
  155 High St.
  Eugene, OR 97401
  (541) 687-5318

Trude Kaufman Senior Center
996 Jefferson
Eugene, OR
(541) 687-5331

Asian Newspaper:

Portland Chinese Times
8020 SE Powell Suite 104
Portland, OR 97206
(503) 771-9560

Asian Reporter Classifieds/weekly newspapers at Pacific NW
922 N Killingsworth St., Suite "1-A"
Portland, OR 97217-2220

Asian Student Associations at Oregon State University:

Chinese Student and Scholars: (541) 737-4515, CSA@MAIL.ORST.EDU

Cultural Organizations and Churches: .

Chinese American Organizations:

Chinese Benevolent Association
3153 Cass
Detroit, Michigan 48201

Chinese Chamber of Commerce
1633 N.E. 42$^{nd}$ Avenue
Portland, Oregon 97213

Chinese Information Service
159 Lexington Avenue
New York, New York 10016

Chinese Churches:

Chinese Faith Baptist Church: (503) 236-8225

Chinese Grace Baptist Church: (503) 533-4314

Chinese Baptist Church in Corvallis: (541) 737-2980

Chinese Lutheran Church at Salem: (503) 371-4517

Chinese Lutheran Church at Eugene: (541) 337-0810

Chinese Evergreen Lutheran Church at Salem: (503) 375-0838

Oriental Grocers:

An Dong Oriental Food Co, 5441 SE Powell Blvd, Portland, (503) 777-2463
Anzen Asian Grocers, 736 NE MLK Jr. Blvd, 4021 SW 117th Ave, Beaverton, OR
(503) 627-0913
Asia Market-Beaverton, 12350 SW Broadway, Beaverton, (503) 646-8118
FOU LEE Market Oriental Meats and Groceries, 3811 SE Belmont, Portland,
(503) 239-0215
GO-BU-GI Asian Foods, 4425 SW 110th Ave., Beaverton, (503) 646-4989
International Food Bazaar, 915 SW 9th, Portland, (503) 228-1960
International Food Supply, 510 SE 80th, Portland, (503) 256-9576
International Groceries, 839 N Killingsworth, Portland, (503) 240-077 5
Kim's Food Market, 7330 NE Fremont, Portland, (503) 281-2154
Nikola's Kelso Food Store, 14480 SE Orient Dr., Boring, (503) 668-7731
Oriental Food Value, 8303 SE Insley, Portland, (503) 775-8683
Veng Lao Oriental Food Center, 1032 N Killingsworth, Portland,
(503) 285-7833
Viet & Tai Oriental Food, 18129 SW Tualatin Valley Hy, Aloha, OR
(503) 848-9321
Wing Ming Market, 8340 SE Foster Rd, Portland, (503) 775-5077
Yong's Market, 2626 NE Dekum, Portland, (503) 282-0634
Zupan's Food Pavilion, 19133 Willamette Dr, West Linn, Portland,
(503) 635-6281
Zupan's Markets, 2340 W Burnside, Portland, (503) 497-1088
Sunrise Oriental Market, 2160 W 11th #A, Eugene, OR 97402

Chinese Restaurants:

A Taste of China, 15450 Boones Ferry Rd, Lake Oswego, (503) 699-5056
Ambassador Restaurant & Lounge, 4744 NE Sandy Blvd, (503) 280-0330
Asia Express, 6101 SW Murray Blvd, Beaverton, OR, (503) 646-0439
August Moon Chinese Restaurant, 405 NW 23rd, (503) 248-9040
August Moon Chinese Restaurant, 116 SW Clay, (503) 222-5733
Banboo's Hunan & Szechuan Cuisine, 103 NW 21st, (503) 241-8122
Canton Grill 2610 SE 82rd, (503) 774-1135
Cedar Hills Genghis Khan Mogolian BBQ, 10205 SW Park, (503)297-8466
Chang's Yangrtze, 921 Morrison, Portland, OR, (503) 241-0218

Chen's Dynasty West, 6750 SE, Beaverton, OR, (503) 292-4898
Chin-Yen, 14 NE 28<sup>th</sup>, Portland, (503) 231-7781
China Dolf Restaurant & Lounge, Portland, (503) 653-2599
Chine Garden Restaurant, Portland, (503) 652-1008
China Smorgi, 21940 SW Pacific Hwy, Tiger, (503) 639-1311
Chinese Buffet 38776 Proctor Blvd, Sandy, (503) 668-8524
Chinese Happiness, 1655 NE Division, Gresham, (503) 667-4566
Chinese Village Restaurant & Lounge, 520 SE 82<sup>nd</sup>, Portland,
    (503) 253-7545
Chin's Kitchen, 4132 NE Broadway, Portland, (503) 281-1203
Chopsticks Express, 2651 E Burnside Portland, (503) 234-6771
Chopsticks Express, 10801 SE Main St, Milwaukie, (503) 659-2950
Chopsticks Restaurant, 11137 SW Capitol Hy, Portland, (503) 246-4466
Chu's Eatery, 17110 SE Powell Blvd, Portland, (503) 667-2487
Chu's Eatery, 1390 N Pacific Hwy, Woodburn, (503) 982-2487
Chu's Eatery, 609 SW Broadway, Portland, (503) 242-2487
Great China Seafood Restaurant, Portland, (503) 228-2288
Hung Far Low, 112 NW 4<sup>th</sup>, Portland, (503) 223-8686
Shangri-La Chinese Restaurant, 3337 SW 198<sup>th</sup> Ave, Aloha,
    (503) 649-7355

Appendix 5

Focus Group Interview Questionnaire

Focus Group Interview Questionnaire

1. What do you usually eat for breakfast?

2. What do you usually eat for lunch?

3. What do you usually eat for dinner?

4. What do you usually eat for snacks?

5. Is there anything you want to add?

**Thank you for your time and cooperation!**

Appendix 6

The Written Instruction Packet

including;

(1) An Instruction Sheet for Taking the Food Photos
(2) Figure for Taking Food Photos
(3) One Serving Size Explanation Sheet in English and
    Chinese
    for Each Food Group According to the U. S. D. A. Food
    Guide Pyramid
(4) Documentation for Sequence of Food Photos

Instruction Sheet for Taking Food Photos

1. Separate cooking ingredients.
2. Take one serving size (see the one serving size explanation sheet for each food group) of each ingredient out before cooking and place on a plain plate.
3. Comfortable sit at the table as the usual eating position at a dining room table.
4. At the approximately 42 degree of angle above the horizon, take a picture of each ingredient (see enclosed picture).
5. Please write down the name of the ingredients in sequence that you took the pictures of on the documentation sheet.
6. Please return the cameras within one month (expected completion date is September 20, 1999) and the picture documentation sheet in the postage-paid envelopes.

If you have any questions about the research procedures, please contact WenYen

Juan at (541) 757-6680.

**Thank you for your times and cooperation!!**

# One Serving Size for Each Food Group in English and Chinese

饮食计量单位 (One Serving Size):

(1) 面包和谷类(Breads, Cereals, and Grains):

饮食计量单位 (One Serving Size) =　　一片面包(One slice bread)

半杯谷类食物，米，面 (1/2 cup of cooked cereal, rice, pasta)

1 盎司早餐麦片 (1 oz ready-to-eat cereal)

半个面包 (1/2 bun, bagel, muffin)

一个小晚餐面包(1 small roll)

3 到 4 个饼乾 (3-4 crackers)

(2) 蔬菜类 (Vegetables):

饮食计量单位 (One Serving Size) =　　1/2 杯煮熟蔬菜 (1/2 cup of cooked vegetable)

1 杯生蔬菜 (1 cup of raw vegetables)

1 杯叶类蔬菜 (1 cup of leafy raw vegetable)

1/2 杯煮熟豆类 (1/2 cup of cooked legumes)

1/4 杯蔬菜汁 (1/4 cup of vegetable juice)

(3) 水果类 (Fruits):

饮食计量单位 (One Serving Size) =　　1 个中型苹果，香蕉，桔子 (1 medium apple, banana, orange)

半个柚子 (1/2 grapefruit)

3/4 杯果汁 (3/4 cup juice)

1/2 杯梅子 (1/2 cup berries)

1/2 杯罐头水果丁 (1/2 cup diced, canned fruits)

1/4 杯乾果 (1/4 cup dried fruits)

(4) 肉类 (Meats):

饮食计量单位 (One Serving Size) =　　2 - 3 盎司煮熟的瘦肉，鸡肉，鱼

(2-3 oz lean, cooked meats, poultry, fish)

一个鸡蛋 (1 egg)

1/2 杯煮熟豆类 (1/2 cup cooked legumes)

4 盎司豆腐 (4 oz tofu)

4-6 汤匙的核果类，籽类，花生酱

(4-6 tablespoon nuts, seeds, peanut butter)

(5) 牛奶，奶酪，乳制品 (Milk, Cheese, and Dairy):

饮食计量单位 (One Serving Size) =　　1 杯牛奶，酸奶，优酪乳 (1 cup milk, yogurt)

2 盎司加工奶酪食品 (2 oz processed cheese food)

1.5 盎司奶酪制品 (1 and 1/2 oz of cheese)

Figure for Taking Food Photos



Camera

42° Plate Table
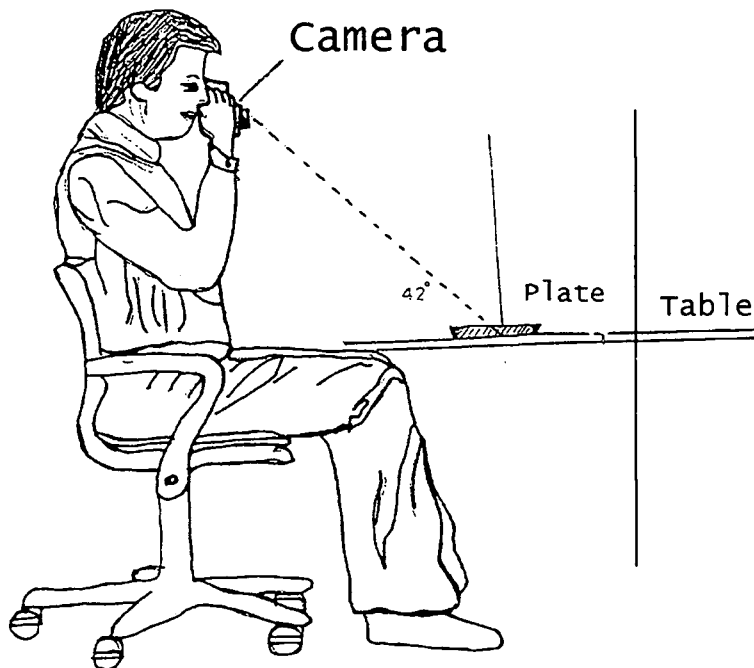
Documentation of Food Photos from Two One-Time Use Cameras

| Camera 1 | Food Item | Camera 2 | Food Item |
|---|---|---|---|
| Picture 1 | | Picture 1 | |
| Picture 2 | | Picture 2 | |
| Picture 3 | | Picture 3 | |
| Picture 4 | | Picture 4 | |
| Picture 5 | | Picture 5 | |
| Picture 6 | | Picture 6 | |
| Picture 7 | | Picture 7 | |
| Picture 8 | | Picture 8 | |
| Picture 9 | | Picture 9 | |
| Picture 10 | | Picture 10 | |
| Picture 11 | | Picture 11 | |
| Picture 12 | | Picture 12 | |
| Picture 13 | | Picture 13 | |
| Picture 14 | | Picture 14 | |
| Picture 15 | | Picture 15 | |
| Picture 16 | | Picture 16 | |
| Picture 17 | | Picture 17 | |
| Picture 18 | | Picture 18 | |
| Picture 19 | | Picture 19 | |
| Picture 20 | | Picture 20 | |
| Picture 21 | | Picture 21 | |
| Picture 22 | | Picture 22 | |
| Picture 23 | | Picture 23 | |
| Picture 24 | | Picture 24 | |
| Picture 25 | | Picture 25 | |
| Picture 26 | | Picture 26 | |
| Picture 27 | | Picture 27 | |

Appendix 7

English and Chinese Versions of

the Nutrition and Health Related Questionnaire

Nutrition Screening for Chinese Elderly

Participant Information Sheet

Participant's First Name: _____

Participant's Last Name: _____

Assigned number: _____

First Contact Date: _____/_____/_____

Follow-up Date: _____/_____/_____

Actual Interview Date: _____/_____/_____

57. Require Translator:
    a. No
    b. Yes

58. Sex (Don't ask, circle one):
    a. Male
    b. Female

59. Body Mass Index (Don't ask, calculate) :_____(wt in kg) / ( ht$^2$ in m)

Do you want to know the research results about your individual's well being?

    a. No
    b. Yes

    └──────▶Address: _____

Nutrition Screening For Chinese Elderly
Nutrition and Health Related Questionnaire

Please choose the **BEST** answer.

1.  Which type of community do you live in?
    1   City
    2   Rural
    3   Urban
    4   Don't know
    5   Choose not to answer

2.  Which of the following best describes your Asian background?
    1   Indian
    2   Cambodian
    3   Chinese
    4   Filipino
    5   Japanese
    6   Korean
    7   Pacific Islanders
    8   Vietnamese
    9   Others (be specific) _____

3.  How long have you been in the United States?
    1   0-6 months
    2   7-12 months
    3   1-3 years
    4   3-6 years
    5   6-10 years
    6   10 years or more
    7   life time
    8   Don't know
    9   Choose not to answer

4.  Which generation are you in the United States?
    1   First
    2   Second
    3   Third
    4   More than third
    5   Don't know
    6   Choose not to answer

5.  Do you eat Asian Food in the United States?
    1   No
    2   Yes
    3   Sometimes

Now, I will ask you about foods you ate or drank from yesterday midnight to this morning midnight. Repeat the questions from 6 to 11 until finish record all foods participants ate and drank within 24 hours

| 6. What was the food you ate or drank at home or away from home after midnight? | 7. When was the time? | 8. Was that a meal or snack? | 9. Please describe all the ingredients in that food | 10. Please estimate the amount | 11. Where did you eat it at?<br>a. home<br>b. restaurant<br>c. coffee shop<br>d. senior center<br>e. friend's or family's place<br>f. others (be specific) |
|---|---|---|---|---|---|
| a. | | | | | |
| b. | | | | | |
| c. | | | | | |
| d. | | | | | |
| e. | | | | | |
| f. | | | | | |
| g. | | | | | |
| h. | | | | | |
| i. | | | | | |
| j. | | | | | |
| k. | | | | | |
| l. | | | | | |
| m. | | | | | |
| n. | | | | | |
| i. | | | | | |
| o. | | | | | |
| p. | | | | | |
| r. | | | | | |

Now, I will ask you some questions related to your diet and health. Please answer each question according to how they apply to you. (Bold question = modified DETERMINE Checklist)

| | Always | Some times | Never |
|---|---|---|---|
| **Eating Habits** | | | |
| *12. Do you have an illness or condition that made you change the kind and/or amount of food you eat?* | | | |
| *13. Do you eat fewer than 2 meals per day?* | | | |
| 14. Do you have not enough food to eat each day? | | | |
| 15. Do you not eat anything on one or more days each month? | | | |
| 16. Do you have poor appetite? | | | |
| *17. Do you eat vegetables two or fewer times daily?* | | | |
| *18. Do you eat milk or milk products once or not at all daily?* | | . | |
| *19. Do you eat fruits or drink fruit juices once or not at all daily?* | | | |
| 20. Do you eat breads, cereals, pasta, rice, or other grains five or fewer times daily? | | | |
| 21. (IF woman) Do you have more than one alcoholic drink per day? (IF man) Do you have more than two alcoholic drinks per day? | | | |
| 22. Are you on a special diet? | | | |
| *23. Do you have tooth or mouth problems that make it hard for you to eat?* | | | |
| 24. Do you have difficulty chewing or swallowing? | | | |
| **Living Environment** | | | |
| 25. Do you live on an income of less than $6000 per year (per person in the household)? | | | |
| *26. Do you always have enough money to buy the food you need?* | | | |
| 27. Do you live alone? | | | |
| *28. Do you eat alone most of the time?* | | | |
| 29. Are you housebound? | | | |
| 30. Are you concerned about home security? | | | |
| 31. Do you have adequate heating or cooling system at home? | | | |
| 32. Do you have a working stove and/or refrigerator? | | | |
| 33. Are you unable or prefer not to spend money on food (< $25-30 per person spent on food each week) | | | |
| *34. Do you take 3 or more different prescribed or over-the-counter drugs a day.* | | | |
| **Functional Status** | | | |
| 35. Do you usually need assistance with bathing? | | | |
| 36. Do you usually need assistance with dressing? | | | |
| 37. Do you usually need assistance with grooming? | | | |
| 38. Do you usually need assistance with toileting? | | | |
| 39. Do you usually need assistance with walking or moving about? | | | |
| 40. Do you usually need assistance with traveling outside the home? | | | |
| *41. Do you usually need assistance with shopping?* | | | |
| 42. Do you usually need assistance with preparing food? | | | |
| 43. Do you usually need assistance with cooking? | | | |
| 44. Do you usually need assistance with eating? | | | |

45. In general, how would you rate your overall health?
    1   Excellent
    2   Very good
    3   Fair
    4   Poor
    5   Don't know
    6   Choose not to answer

46. How important is nutrition related to your health?
    1   Very important
    2   Important
    3   Not too important
    4   Not important at all
    5   Don't know
    6   Choose not to answer

47. Have you ever been told by doctors or nurses that your have any health problems?
    1   No
    2   Yes

    47a. What kind of health problem did doctors or nurses tell you that you have (circle all that apply)?

    1   Cancer
    2   Diabetes
    3   Heart Disease
    4   Hypertension
    5   Others (be specific)_____
    6   Don't know
    7   Choose not to answer

48. Do you receive any benefit from the governmental program, such as.......... ?
    (circle all that apply)

    1   Oregon Trail Card Program (Electronic Benefit Transfer Debit card)
    2   Senior Nutrition Meals Program

    48a. Which Senior Nutrition Meal Program are you participating in?

        a.   Home-Delivered Meal
        b.   Congregate Meal

    3   Social Security Benefit Program
    4   Medicaid
    5   Medicare
    6   Others (be specific)_____
    7   None
    8   Don't know
    9   Choose not to answer

49. Do you take any kind of nutritional supplements?
    1 No
    2 Yes
    3 Sometimes

50. Do you speak or read English when you do grocery shopping?
    1 No
    2 Yes
    3 Sometimes

51. Do you have health insurance coverage, such as Medicare, Medicaid, Blue Cross/ Blue Shield, Oregon Health Plan, etc.?
    1 No
    2 Yes

52. How many years of school have you completed?
    1   0-4 years
    2   5-8 years
    3   Some high school
    4   Post high school
    5   Some college
    6   College degree
    7   Graduate school

53. What is your most recent weight in kilograms? _____ (or in pounds _____?)

54. Without wanting to, have you lost or gained 10 pounds in the last 6 months?
    1   No
    2   Yes

55. What is your most recent height in centimeters? _____ (or in inches _____?)

56. Could you tell me your
    1   Age: _____years old
    2   Don't know (estimate : _____ years old)
    3   Choose not to answer (estimate : _____ years old)

## THANK YOU FOR YOUR TIME AND COOPERATION!

年長亞洲美國人的營養審查與評估

營養與健康相關的問卷調查

參與者資料

參與者的姓名: _____

參與者的編號: _____

第一次聯絡日期: _____

第二次聯絡日期: _____

實際面談日期: _____

57. 需要翻譯員嗎?
   1 否
   2 是

58. 性別:
   1 男
   2 女

59. 身體質量指數: _____ (公斤/公尺 $^2$)

您想知道有關於您個人健康的研究結果嗎?
   1 否
   2 是
   → 地址: _____
              _____

年長亞洲美國人的營養審查與評估

營養與健康相關的問卷調查

請圈出最好的答案

1. 您住在哪一個社區？
    1　城市
    2　鄉村
    3　都市
    4　不知道
    5　選擇不回答

2. 您的文化背景
    1　亞洲印度人
    2　高棉人
    3　中國人
    4　菲律賓
    5　日本人
    6　韓國人
    7　太平洋島人
    8　越南人
    9　其他　（請指名＿＿＿＿＿）

3. 您在美國多久了？
    1　0 – 6 個月
    2　7 – 12 個月
    3　1 – 3 年
    4　3 – 6年
    5　6 – 10 年
    6　10 年以上

4. 從您家屬來美國算起，您是第幾代住在美國的？
    1 第一代
    2 第二代
    3 第三代
    4 多於第三代
    5 選擇不回答

5. 您在美國吃東方食品嗎?

   1　通常

   2　有時

   3　從不

請重複問題 6 到 11，直到被訪問者 24 小時內所有的飲食都以記錄下來（從昨晚凌晨 12 點到今天凌晨 12 點）

| 6. 從昨晚凌晨 12 點後，您在家或在外吃或喝了些什麼? | 7. 什麼時候? | 8. 是哪一餐或點心? | 9. 請描述食物內所包含的成分。 | 10. 請估計其成分的數量。 | 11. 您在哪裡吃的?<br>a. 家裡<br>b. 餐廳<br>c. 咖啡廳<br>d. 老年人中心<br>e. 朋友家或親戚家<br>f. 其他 |
|---|---|---|---|---|---|
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下面是有關於您的飲食與健康問題，請回答下列問題：

| | 通常 | 有時候 | 從不 |
|---|---|---|---|
| **飲食習慣** | | | |
| 12. 您有沒有什麼疾病必須讓您改變您攝取的食物種類或數量？ | | | |
| 13. 您一天吃少於兩餐嗎？ | | | |
| 14. 您每日有足夠的食物嗎？ | | | |
| 15. 每個月中，您是否有一天或多於一天以上沒有吃東西？ | | | |
| 16. 您的胃口差嗎？ | | | |
| 17. 您每日吃兩次或兩次以下的蔬菜嗎？ | | | |
| 18. 您每日食用一次或一次以下牛奶或牛奶製品嗎？ | | | |
| 19. 您每日食用一次或一次以下水果或果汁嗎？ | | | |
| 20. 您每日食用五次或五次以下麵包，麥片粥，麵類，米類或其他穀物嗎？ | | | |
| 21. （女性回答）您一天喝酒多於一次嗎？<br>　　（男性回答）您一天喝酒多於兩次嗎？ | | | |
| 22. 您現在食用特殊飲食嗎？ | | | |
| 23. 您是否有牙齒或口腔的問題使您飲食有困難？ | | | |
| 24. 您再在嚼或吞食食物方面有困難嗎？ | | | |
| **居住狀況** | | | |
| 25. 您一年生活的收入少於$6000元美金嗎？ | | | |
| 26. 您經常有足夠的錢買您所需要的食物嗎？ | | | |
| 27. 您自己一個人住嗎？ | | | |
| 28. 您大部份的時間是自己一個人吃飯嗎？ | | | |
| 29. 您平常不出門的嗎？ | | | |
| 30. 您關心您的住家安全嗎？ | | | |
| 31. 您家中設有暖氣或冷氣系統嗎？ | | | |
| 32. 您家中有可使用的火爐或冰箱嗎？ | | | |
| 33. 您不能或不喜歡把錢花在食物上嗎（平均每人一星期花在食物上的錢少於$25到$30美金）？ | | | |
| 34. 您一天服用三種或三種以上的醫生處方或藥店買的藥嗎？ | | | |
| **體能狀況** | | | |
| 35. 您在洗澡時通常需要別人幫忙嗎？ | | | |
| 36. 您在穿衣時通常需要別人幫忙嗎？ | | | |
| 37. 您在盥梳時通常需要別人幫忙嗎？ | | | |
| 38. 您在上廁所時通常需要別人幫忙嗎？ | | | |
| 39. 您在走路或移動時通常需要別人幫忙嗎？ | | | |
| 40. 您在外出時通常需要別人幫忙嗎？ | | | |
| 41. 您在購物逛街時通常需要別人幫忙嗎？ | | | |
| 42. 您在準備食物時通常需要別人幫忙嗎？ | | | |
| 43. 您在煮飯時通常需要別人幫忙嗎？ | | | |
| 44. 您在吃東西時通常需要別人幫忙嗎？ | | | |

45. 整體來說，您的身體健康狀況
　　1 非常好
　　2 很好
　　3 好
　　4 不好
　　5 不知道
　　6 選擇不回答

46. 您覺得食品營養對於您的身體健康有多重要？
　　1 非常重要
　　2 重要
　　3 不是很重要
　　4 一點也不重要
　　5 不知道
　　6 選擇不回答

47. 曾經有醫生或護士告訴過您的身體健康狀況有問題嗎？
　　1 否
　　2 是

　　→ 47a. 醫生或護士告訴您哪一方面的健康問題呢？（請圈出您有的）
　　　　1 癌症
　　　　2 糖尿病
　　　　3 心臟病
　　　　4 高血壓
　　　　5 其他 （請指名）_____
　　　　6 不知道
　　　　7 選擇不回答

48. 您服用任何的營養補充劑嗎？
　　1 否
　　2 是
　　3 有時候

49. 您從政府機關那裡有得到任何福利嗎？（圈出所有您有的）
　　　1 糧票
　┌─ 2 老年人營養餐
　└─▶ 49a. 參加哪一種老年營養餐？
　　　　　　　1 居家送餐
　　　　　　　2 團體飲食
　　　3 社會福利計畫
　　　4 老年醫療保險
　　　5 醫療保險
　　　6 其他（請指名）_____
　　　7 沒有
　　　8 不知道
　　　9 選擇不回答

50. 您自己去雜貨店買東西時，能說或閱讀英文嗎？
　　　1 否
　　　2 是
　　　3 有時候

51. 您有健康保險嗎？
　　　1 否
　　　2 是

52. 您完成了幾年的教育？
　　　1　0－4 年
　　　2　5－8 年
　　　3　受過某種高中教育
　　　4　高中畢業
　　　5　受過某種大學教育
　　　6　大學畢業
　　　7　研究所

53. 您現在的體重是幾公斤？ _____

54. 在不自覺時，您有沒有在最近 6 個月內增加或減輕 10 磅體重？
　　　1 否
　　　2 是

55. 您現在身高幾公分？_____

56. 您可否告訴我您的
    1　生日：_____
    2　不知道（估計：_____幾歲）
    3　選擇不回答（估計：_____幾歲）


感謝您寶貴的時間與您的協助！

Appendix 8

English and Chinese Versions of

Informed Consent Forms

Nutrition Screening for Chinese Elderly

Informed Consent Form for the Focus Group Interview

_____    _____
(Name of the Participant)              (Date)

1.  Title of the Research Project:

    Nutrition Screening for Chinese Elderly

2.  Investigators

    WenYen Juan, MS.                      Ann Messersmith, Ph.D., R.D., L.D.
    The Department of Nutrition           The Department of Nutrition and
    and Food Management                     Food Management
    Milam Hall 108                        Milam Hall 108
    Oregon State University               Oregon State University
    Corvallis, OR 97331                       Corvallis, OR 97331
    (541) 737-3561                        (541) 737-3561

3.  Purpose of the Research Project

    This study is designed to evaluate the adequacy of food intakes and nutritional risk status
    among Chinese persons age 70 or older living in the Northwest Areas in the State of Oregon.

4.  Explanation of Procedures: I have received an oral and written explanation of this study and I
    understand that as a participant in this study the following things will happen:

    a.    Pre-study Screening:
    Asian Americans have been the fastest growing population in the United States, especially
    in the Northwest region.  This population will continue to experience the highest growth
    rate until the year 2025.  Asian Americans age 60 or older who live in the northwest areas
    of the state of Oregon will be contacted by the Oregon State University researchers.  The
    community organizations will be contacted to identify Asian American elderly age 60 or
    older.  Community organizations in the north and west regions of Oregon will include the
    Office of Minority Health in Portland, senior centers, religious organizations, minority
    students associations, local cultural clubs, and grocery stores and restaurants.  Identified
    Asian American elderly will be invited to participate in this nutrition research project
    during one initial contact and two follow-up contacts.

    b.    What participants will do during the study:
    There will be a one-hour audio-taped face-to-face focus group interview for each group of
    six elderly participants.  The participant will be asked to answer about their commonly
    eating food items at breakfast, lunch, and dinner, or for snacks. During the focus group
    interview, the participants will be trained to take food photos by a graduate student from
    the Department of Art at Oregon State University accompanied with a one serving size
    explanation sheet.  The explanation sheet will be written in native Asian languages.  The
    participants will receive two one-time use cameras and ask to take food photos of the
    commonly eaten food items that they have talked about during the interviews.  The
    cameras will be asked to be returned within one month of time and with a record of the
    sequence of photos in a postage paid envelop.

c. Foreseeable risks or discomfort:
The only potential risks or discomfort to the participants in this research project would be responding to personal questions, such as kinds of foods eaten or culturally specific foods. However, participants can choose not to answer those questions.

d. Benefits to be expected from the research:
Potential benefits of the research results include: (1) enhance Asian culturally specific nutrition assessment method for the elderly; (2) participants will receive a photo album with color food photos. In the future, nutritional assessment can be done appropriately for Asian American elderly.

5. Confidentiality:

Any information obtained from the participant will be kept confidential. A code number will be used to identify any information that participants provide in order to identify the research results. The only persons who will have access to this information will be the investigators, and no names will be used in any data summaries or publications.

6. Voluntary Participation Statement:

Participants will be invited to participate in this study which is completely voluntary, and they can either participate or withdraw from the study at any time.

7. If you have questions:

Any questions about the research study and/or specific procedures should be directed to WenYen Juan, Department of Nutrition and Food Management, Milam Hall 108, Corvallis, OR 97331. (541) 737-3561.

8. Understanding and Compliance: **My signature below indicates that I have read or received oral explanation of the research procedures, and I understand the procedures described above and give my informed and voluntary consent to participate in this study. I understand that I will receive a signed copy of this consent form in the mail after the verbal interview has completed.**

_____  _____  _____
Signature of Participant   Name of Participant          Date Signed


_____  _____
Participant's Present Address          Participant's Phone Number


_____  _____
Signature of Principal Investigator              Date Signed

Nutrition Screening for Chinese Elderly

Informed Consent Form for the Face-to-Face Nutrition and health status interviews

_____     _____
(Name of the Participant)              (Date)

1.  Title of the Research Project:
    Nutrition Screening for Chinese Elderly

2.  Investigators

    WenYen Juan, MS.                         Ann Messersmith, Ph.D., R.D., L.D.
    The Department of Nutrition              The Department of Nutrition and
    and Food Management                      Food Management
    Milam Hall 108                           Milam Hall 108
    Oregon State University                  Oregon State University
    Corvallis, OR 97331                      Corvallis, OR 97331
    (541) 737-3561                           (541) 737-3561

3.  Purpose of the Research Project

    This study is designed to evaluate the adequacy of food intakes and nutritional risk status
    among Chinese persons age 70 or older living in the Northwest Areas in the State of Oregon.

4.  Explanation of Procedures: I have received an oral and written explanation of this study and I
    understand that as a participant in this study the following things will happen:
    a.  Pre-study Screening:
    Asian Americans have been the fastest growing population in the United States,
    especially in the Northwest region. This population will continue to experience the
    highest growth rate until the year 2025. Asian Americans age 60 or older who live in the
    northwest areas of the state of Oregon will be contacted by the Oregon State University
    researchers. The community organizations will be contacted to identify Asian American
    elderly age 60 or older. Community organizations in the north and west regions of
    Oregon will include the Office of Minority Health in Portland, the Senior and Disability
    Divisions, senior centers, religious organizations, minority students associations, and
    local cultural clubs. Identified Asian American elderly will be invited to participate in
    this nutrition screening research project during one initial contact and two follow-up
    contacts.

    b.  What participants will do during the study:
    There will be a 20- to 30-minutes face-to-face interview for each elderly participant. The
    participant will be asked to answer one nutrition and health related verbal questionnaire
    including two major parts: (1) twenty-four hour dietary recall is used to record the
    amount of foods consumed in the previous 24-hour period of time; (2) the nutritional
    health risk questions include nutrition screening tools: the DETERMINE checklist and
    Level I Screen. These two screening tools are used to identify nutritional health risks
    among the elderly. In addition, demographic questions, acculturation questions, attitude
    toward nutrition and health, health status, awareness of nutrition, accessibility of cultural
    foods, and receiving government benefit or health insurance will also be included in the
    verbal questionnaire. Weight and height will be measured using weight scale and
    Frankfort horizontal plane for ambulatory participants. Knee height will be measured for
    estimating the height of ambulatory elderly who can not stand up straight.

c. Foreseeable risks or discomfort:
The only potential risks or discomfort to the participants in this research project would be responding to personal questions, such as income, health status, and attitude toward nutrition and health. However, participants can choose not to answer those questions.

d. Benefits to be expected from the research:
Potential benefits of the research results include: (1) a simple and effective nutrition assessment tool may be used to evaluate nutrition risk status among Asian American elderly because this population group is less likely to seek health professionals and/or to have health insurance; (2) increased self-awareness of participants' nutritional status; (3) nutrition-related risk factors may be identified. Those risk factors can be used to predict nutritional risk status among Asian American elderly. Furthermore, nutritional intervention can be done to prevent severe deterioration.

5. Confidentiality:

Any information obtained from the participant will be kept confidential. A code number will be used to identify any information that participants provide in order to identify the research results. The only persons who will have access to this information will be the investigators, and no names will be used in any data summaries or publications.

6. Voluntary Participation Statement:

Participants will be invited to participate in this study which is completely voluntary, and they can either participate or withdraw from the study at any time.

7. If you have questions:

Any questions about the research study and/or specific procedures should be directed to WenYen Juan, Department of Nutrition and Food Management, Milam Hall 108, Corvallis, OR 97331. (541) 737-3561.

8. Understanding and Compliance: **My signature below indicates that I have read or received oral explanation of the research procedures, and I understand procedures described above and give my informed and voluntary consent to participate in this study. I understand that I will receive a signed copy of this consent form in the mail after the verbal interview has completed.**

_____     _____     _____
Signature of Participant     Name of Participant          Date Signed


_____          _____
Participant's Present Address              Participant's Phone Number


_____          _____
Signature of Principal Investigator        Date Signed

東方老年人營養健康狀況評估研究計畫

正式同意通知表
個人面談

_____     _____
參加者姓名                       日期

1. 研究計畫:
   東方老年人營養健康狀況評估

2. 研究計畫者:
   阮文岩
   食品營養與餐飲管理學系
   奧立岡州立大學
   電話: (541) 757-6680

3. 參與研究計畫目的:
   評估奧立岡州西北部 70 到 90 歲中國老年人飲食均衡和營養健康狀況。

4. 程序說明:
   參與者在這調查中所需要做的事情:
   (a) 在個人面談中:
      每位參與者將會有一個 20 到 30 分鐘面對面的訪問。訪問內包括: (1) 24 小時內所有吃的食物, (2) 營養健康狀況的問題 ("決定調查表 (DETERMINE Checklist)" 及 "一級營養評估 (Level I Screen)")。家人鼓力一並參加訪問。身高和體重一並會計錄。

   (b) 預計危險:
      參與者可能會被問到不適宜的私人問題 例如所食的食物, 但是您可隨時終止面談。

   (c) 參與研究獎勵:
      (1) 加強東方老年人營養健康狀況評估調查。
      (2) 您將會得到一本相簿以及您拍攝的照片做為參加研究獎勵。
      (3) 未來有適於東方老年人營養健康狀況的評估調查。

5. 機密度:

   任何從您得到的消息，將會保持避秘，只有指示號碼會被使用來評估研究結果。除了主任研究員，沒有任何人可拿到資料，也沒有任何人的名字會被使用。

6. 自願參與聲明:

   我了解我是完全自願參與此研究計劃，我可以在任何時間參與或是退出此研究計劃。

7. 如果有任何問題:

   如果有任何問題有關於此研究計劃，請洽阮文岩奧立岡州立大學，食品營養與餐飲管理學系，電話: (541) 757-6680。如果有任何問題有關於我參與此研究計劃的權利，請洽奧立岡州立大學研究中心，電話: (541) 737-8008。

8. 了解與承諾:

   我底下的簽名代表，我已閱讀並了解上述所描述的過程，並代表我正式同意參與此研究計劃。
   我了解，我將會在面談之後收到我的考貝版。


   _____        _____        _____
   參加者簽名                        參加者姓名                          日期


   _____        _____
   參加者現今地址                      參加者電話號碼


   _____        _____
   研究計畫者簽名                      日期

Appendix 9

Code Book

Code Book

| Q # | Question | Variables | Column # | Define | Domain |
|---|---|---|---|---|---|
| | Participant ID | ID | 1 | 1 to 58 | ID |
| 1 | type of community live in | Communit | 2 | 1=city, 2=rural, 3=urban, 4=don't know, 5=choose not to answer | Demographic |
| 2 | Asian background | Ethnic | 3 | 1=Indian, 2=Camboodian, 3=Chinese, 4=Filipino, 5=Japanese, 6= Korean, 7=Pacific Islanders, 8=Vietanamese, 9=Others | Demographic |
| 3 | Length of time in US | Dura | 4 | 1=0-6mo, 2=7-12mo, 3=1-3yr, 4=3-6yr, 5=6-10yr, 6= >10yr, 7=lifetime, 8=don't know, 9=choose not to answer | Acculturation |
| 4 | Generation | Genern | 5 | 1=first, 2=second, 3=third, 4= >third, 5=don't know, 6=choose not to answer | Acculturation |
| 5 | Eat Asian food in US | EatAfood | 6 | 1=no, 2=yes, 3=sometimes | Accessibility |
| 6-10 | Foods eaten in 24 hours | | 7 | | Food consumption |
| | Chicken | Meat1 | 8 | X2 /S=FVS | FVS |
| | Fish | Meat2 | 9 | | FVS |
| | Pork | Meat3 | 10 | | FVS |
| | Beef | Meat4 | 11 | | FVS |
| | egg | Egg5 | 12 | | FVS |
| | Tofu | Meat5 | 13 | | |
| | Total meat servings | totMeat | 14 | >2 | FVS |
| | Whole milk | Milk1 | 15 | X2 /S=FVS | FVS |
| | Lowfat milk | Milk2 | 16 | | FVS |
| | Skim milk | Milk3 | 17 | | FVS |
| | Yogurt | Milk4 | 18 | | FVS |
| | Milk dessert | Milk5 | 19 | | FVS |
| | Cheese | Milk6 | 20 | | FVS |
| | Soymilk | Milk7 | 21 | | |
| | Total milk product servings | totMilk | 22 | >2 | FVS |
| | Potato | Veg1 | 23 | X1 /S=FVS | FVS |

| | | Dark green vegetables | Veg2 | 24 | | FVS |
|---|---|---|---|---|---|---|
| | | Tomato, carrot | Veg3 | 25 | | FVS |
| | | Lettuce | Veg4 | 26 | | FVS |
| | | Green beans, pickle, celery, cauliflower, cabbage, onion, mushroom | Veg5 | 27 | | FVS |
| | | Corn, lima beans, pea | Veg6 | 28 | | FVS |
| | | Asian veget | Veg7 | 29 | | FVS |
| | | Total veget servings | totVeg | 30 | >3 | FVS |
| | | Citrus fruit | Fruit1 | 31 | X1 /S=FVS | FVS |
| | | Apple | Fruit2 | 32 | | FVS |
| | | Banana | Fruit3 | 33 | | FVS |
| | | Melons, berries, grapes, kiwi | Fruit4 | 34 | | FVS |
| | | Fruit juices | Fruit5 | 35 | | FVS |
| | | Asian fruits | Fruit6 | 36 | | |
| | | Total fruit servings | TotFruit | 37 | >2 | FVS |
| | | Whole grain breads, brown rice | Grain1 | 38 | X1 /S=FVS | FVS |
| | | Total yeast breads | Grain2 | 39 | | FVS |
| | | Cereals | Grain3 | 40 | | FVS |
| | | RTE cereals | Grain4 | 41 | | FVS |
| | | Rice | Grain5 | 42 | | FVS |
| | | Noodle | Grain6 | 43 | | FVS |
| | | Crackers, | Grain7 | 44 | | FVS |
| | | Cake, cookies | Grain8 | 45 | | FVS |
| | | Total grain servings | TotGrain | 46 | >6 | FVS |
| | | Total fat servings | TotFat | 47 | | |
| 8 | | Snack type | Snamilk | 48 | Numerical | Snack habit |
| | | | Snameat | 49 | Numerical | Snack habit |
| | | | Snafruit | 50 | Numerical | Snack habit |
| | | | Snavege | 51 | Numerical | Snack habit |
| | | | Snagrain | 52 | Numerical | Snack habit |
| 11 | | Breakfast eat at location | Breakat | 53 | 1=home, 2=restaurant, 3=cooffee shop, 4= senior center, 5= friend's, 6= others | Eat at home affecting nutrient consumption |
| | | Lunch eat at location | Lunchat | 54 | 1=home, 2=restaurant, 3=cooffee shop, 4= senior center, 5= friend's, 6= others | Eat at home affecting nutrient consumption |

| | Dinner eat at location | Dinneat | 55 | 1=home, 2=restaurant, 3=cooffee shop, 4= senior center, 5= friend's, 6= others | Eat at home affecting nutrient consumption |
|---|---|---|---|---|---|
| 12 | Illness change food eaten | Sickfood | 56 | 1=never, 2=sometimes, 3=always | Determine X2 |
| 13 | Eat <2 meals/day | Mealless | 57 | 1=never, 2=sometimes, 3=always | Determine X3 |
| 17 | Eat veg <2/day | Vegeless | 58 | 1=never, 2=sometimes, 3=always | Determine X2 |
| 18 | Eat milk/ milk products <1/day | Milkless | 59 | 1=never, 2=sometimes, 3=always | Determine X2 |
| 19 | Eat fruit/ fruit juices <1/d | Fruitless | 60 | 1=never, 2=sometimes, 3=always | Determine X2 |
| 21 | More alcohol beverages | Morealcol | 61 | 1=never, 2=sometimes, 3=always | Determine X2 |
| 23 | Tooth or mouth problems | Oralprob | 62 | 1=never, 2=sometimes, 3=always | Determine X2 |
| 26 | Enough money buy foods | Enoughmo ne | 63 | 1=never, 2=sometimes, 3=always | Determine X4 |
| 28 | Eat alone most of the time | Eatalone | 64 | 1=never, 2=sometimes, 3=always | Determine X1 |
| 35 | Take >=3 prescribed drugs | Drugmore3 | 65 | 1=never, 2=sometimes, 3=always | Determine X1 |
| 41 | Need assistance shopping | Needshop | 66 | 1=never, 2=sometimes, 3=always | Determine X2 |
| 43 | Need assistance cooking | Needcook | 67 | 1=never, 2=sometimes, 3=always | Determine X2 |
| 44 | Need assistance eating | Needeat | 68 | 1=never, 2=sometimes, 3=always | Determine X2 |
| 45 | not wanting gain/loss 10pd | Wt10less | 69 | 1=never, 2=sometimes, 3=always | Determine X2 |
| 14 | Not enough foods to eat/day | Nofood | 70 | 1=never, 2=sometimes, 3=always | Level I |

| 15 | Not eat >1day/month | Noteat1d | 71 | 1=never, 2=sometimes, 3=always | Level I |
|----|---------------------|----------|----|--------------------------------|---------|
| 16 | Poor appetite | poorApp | 72 | 1=never, 2=sometimes, 3=always | Level I |
| 20 | Eat breads<5 /day | grainess | 73 | 1=never, 2=sometimes, 3=always | Level I |
| 22 | Special diet | Specdiet | 74 | 1=never, 2=sometimes, 3=always | Level I |
| 24 | Chewing/swallowing Difficulty | Chewprob | 75 | 1=never, 2=sometimes, 3=always | Level I |
| 25 | Income <=6000/year | Income | 76 | 1=never, 2=sometimes, 3=always | Level I |
| 27 | Live alone | Livealon | 77 | 1=never, 2=sometimes, 3=always | Level I |
| 29 | Housebound | Housboun | 78 | 1=never, 2=sometimes, 3=always | Level I |
| 30 | Concern home security | Homesecu | 79 | 1=never, 2=sometimes, 3=always | Level I |
| 31 | Heating/cooling system | Heatcool | 80 | 1=never, 2=sometimes, 3=always | Level I |
| 32 | Working stove or refrigerator | stovrefg | 81 | 1=never, 2=sometimes, 3=always | Level I |
| 33 | Preference spend money on food | monefood | 82 | 1=never, 2=sometimes, 3=always | Level I |
| 35 | Need assistance bathing | Needbath | 83 | 1=never, 2=sometimes, 3=always | Level I |
| 36 | Need assistance dressing | Needdres | 84 | 1=never, 2=sometimes, 3=always | Level I |
| 37 | Need assistance grooming | Needgrom | 85 | 1=never, 2=sometimes, 3=always | Level I |
| 38 | Need assistance toileting | Needtoil | 86 | 1=never, 2=sometimes, 3=always | Level I |
| 39 | Need assistance walking | Needwalk | 87 | 1=never, 2=sometimes, 3=always | Level I |

| 40 | Need assistance traveling outside the home | Needtrav | 88 | 1=never, 2=sometimes, 3=always | Level I |
|----|------|------|----|------|------|
| 42 | Need assistance preparing foods | Needprep | 89 | 1=never, 2=sometimes, 3=always | Level I |
| 45 | Self-rated health | Selfheal | 90 | 4=excellent, 3=very good, 2=fair, 1=poor, 5=don't know, 6=choose not to answer | attitude |
| 46 | Importance of nutrition | Nutrimpo | 91 | 4=very, 3=important, 2=not too, 1=not at all, 5=don't know, 6=choose not to answer | attitude |
| 47 | Health problem | Healprob | 92 | 1=no, 2=yes | Health status |
| 47a | What kind of health problem | Kinheapr | 93 | 1=cancer, 2=DM, 3=heart Dz, 4=HBP, 5=others, 6=don't know, 7=choose not to answer | Health status (type of disease related to diet) |
| 48 | Nutrition supplements | Nusupple | 94 | 1=never, 2=sometiems, 3=always | attitude |
| 49 | Benefit from government | Govbene | 95 | 1=food stamp, 2=free meal, 3= SSI, 4=medicaid, 5= medicare, 6= others, 7= none | Government Support |
|  | Food stamp | Foodstam | 96 | 1=no, 2=yes | Government benefit |
| 49a | Elderly nutrition program | Oldnutr | 97 | 1=no, 2=yes | Government benefit |
|  | Social security | SSI | 98 | 1=no, 2=yes | Government benefit |
|  | Medicare | medicare | 99 | 1=no, 2=yes | Government benefit |
|  | Additional health insurance | addinsur | 100 | 1=no, 2=yes | Government benefit |
| 50 | Speak English | Spekeng | 101 | 1=no, 2=yes, 3=sometimes | Language |
| 51 | Health insurance | Healinsu | 102 | 1=no, 2=yes | Insurance |
| 52 | Years of school | Edu | 103 | 1=0-4yr, 2=5-8yr, 3=some high, 4=post high, 5=some college, 6=college, 7=graduate | Demo |
| 53 | Recent weight | Wt | 104 | Numerical | Health status |
| 54 | Recent height | Ht | 105 | Numerical | Health status |
| 56 | Can you tell me your age | Age | 106 | Numerical | Demo |
| 57 | Translator requirement | Transreq | 107 | 1=no, 2=yes | Language |

| 58 | sex | Sex | 108 | 1=male, 2=female | Demo |
|----|-----|-----|-----|------------------|------|
| 59 | Body Mass Index | Bmi | 109 | Numerical | Health status |
| 60 | Want to know research result | Research | 110 | 1=no, 2=yes | Attitude |

Appendix 10

Focus Group Interview Transcription

Nutrition Screening for Chinese Elderly

Focus Group Interviews Transcript

Date: August 26, 1999
Time: 11:00 AM to 12:30 PM
Place: King Tin Restaurant.
Present: Participant 1, Participant 2, Participant 3, Participant 4, Participant 5,
        Participant 6, and Researcher (WenYen Juan)
Sitting: Around in a circle table, to my left, starting Participant 1, Participant 2,
        Participant 3, Participant 4, Participant 5, and Participant 6.
        Interview language: Mandarin, Participant 6 answered in English.

WenYen: (after explain Informed Consent Form), Would you like me to interview you in English or Chinese? Chinese? (most of them nodding their heads) Ok, I will take turn to ask you about your commonly eaten food items for three meals every day. The gentleman goes first for, so what do you usually eat for breakfast?

Participant 1: My breakfast is very simple, 2 toasts, 1 bowl of oatmeal, 1 cup of coffee, 1 cup of fruit juice. And that is about it.

Participant 5: My breakfast is a mass. But I always eat breads, without butter or jam, and 1 large glass of orange Juice.

WenYen: What kind of bread do you usually eat, Participant 5?

Participant 5: White bread.

WenYen: so Participant 1, what kind of bread is yours?

Participant 1: it's also white bread.

WenYen : How about Participant 2?

Participant 2: Not always the same. Ensure and vitamin.

WenYen: What kind of ensure and vitamin do you take?

Participant 2: Do you know the Ensure?

WenYen: Yes, but what kind of the flavor, and with or without fiber added in your Ensure, and dosage for your vitamin, do you know the brand of your vitamin, if you do, I can check the amount of the vitamin you take?

Participant 2: Vanilla flavor and no fiber added. Also, the Gerital vitamin C (500 mg) and vitamin E (400 IU) are recommended by my doctor. And aspirin is in my own prescription because I have blood clotting problem and I heard that aspirin is good for this problem.

Participant 5: I also want to add that I take vitamin C and vitamin E every day.

WenYen: Would you know the amount of your vitamin C?

Participant 5: Yes, that is 100 mg.

Participant 2: 100 is too little. (Laughing!)

Participant 5: Oh, no, I am sorry, I say it wrong, (laughing), well it should be 500 mg. And I take 2 of them twice a day.

WenYen: And your vitamin E?

Participant 5: it's 500 units. Also, I take calcium which includes vitamin D and one a day kind of multiple vitamin.

WenYen: ok, is there anything else?

Participant 5: That's about it.

WenYen: (look at Participant 3)

Participant 3: My breakfast is a little large. One cup of milk added to the oatmeal, one egg, one white toast, one grapefruit, multiple vitamins (one a day), vitamin E (it's 400 mg), vitamin C (it's 500 mg), Calcium and Magnesium (it's 750 mg). That is all.

WenYen: (look at Participant 4)

Participant 4: I always eat cereal in the morning.

WenYen: What kind?

Participant 4: I change different brands every other day. I always watch the fat content of the cereals, the content of the fat cannot over 3 g and the fiber content has to be over 3 g, if the content is too little, I don't eat those kinds.

WenYen: So what kind of cereal has the fiber over 3 g that you usually eat?

Participant 4: Sometimes is granola, raisin bran, oatmeal square, and I always change different kinds of cereals. And this is always with a glass of milk.

WenYen: What kind of milk?

Participant 4: Skim milk, and one slice of toast.

WenYen: What kind of the bread, white or wheat?

Participant 4: No, never white bread. Wheat or wheaten (?) bread, and I always change different kind of those breads. And one Unicap multivitamins. And add one calcium and one juice. And the juice is always the kind with vitamin C fortified juice only.

Participant 3: I want to add something, sometime(s), my breakfast includes the Morning Heart brand breakfast, which includes bacon or sausage and orange juice. That's all.

WenYen: And Participant 3? What kind of milk do you drink?

Participant 3: Skim milk.

WenYen: (look at Participant 6)

Participant 6: 2 pieces of whole wheat toast, and chunky peanut butter, a glass of apple juice, one banana. Sometimes, I have a hard-boiled egg. In the morning, I take one pill, a multiple vitamin with Magnesium, Wheatvital (?) and this is heath supplement, you know. I have other kind of pills, this is my morning.... I like my peanut butter. You know you need your oil too, right?

Participant 5: I can't have any milk. I don't like the smell of it.

WenYen: Is there any other kinds of the food that you think you have and want to add to it? Okay, let's move on lunch. What do you usually eat for lunch? Participant 6, would you like to go first?

Participant 6: Rice sometimes, sometimes the whole wheat dumplings.

WenYen: What kind of dumpling, the whole wheat dinner roll?

Participant 6: I made my own dumpling. Most of are rice at lunches. Vegetables, a lot of vegetables. Salads, with cucumber.

WenYen: Salad, is there lettuce?

Participant 6: Sometimes I have lettuce. But it's the Chinese way to cook. With sesame oil.

Chinese way to cook with oil, I just avoid oil. I have removed the skin chicken. Sometimes, I have chicken and fish, I change. Lunch times, I take estrogen, I have tilgen (?), in the morning, I take, you know, vitamin. Then, I have a glass of orange juice, all day, I drink a lot of water, no coffee, no tea, and water. But now, I drink a lot of water, in the mean time, I take all the skin off the meat, remove the skin off the chicken and remove the skin. Sometimes is chicken, sometimes is fish.

WenYen: What kind of rice do you eat?

Participant 6: I get it from the American grocery store. Am...., the Thai ? yes, the Thai rice, the "chou mi"?.

WenYen: You said you have lettuce, as your vegetables and cucumber. Anything else?

Participant 6: And carrot, and broccoli, and sometimes, the bean sprout, with Chinese chi. Stir fry with the Chinese chi, it tastes very good, I like it. And parsley, Chinese cabbage.

WenYen: the Chinese Napa cabbage?

Participant 6: No, the green Chinese cabbage. The small, and not very long kind. The little Chinese white cabbage. Sometimes, the tofu too, I have tofu in my salad, sometimes, I couldn't cook, I put sauce, garlic with it and sesame seed oil. I think I eat a lot of vegetables.

WenYen: And what part of chicken do you usually eat?

Participant 6: I like the leg, chicken leg, I like chicken, I remove all the skin.

WenYen: what kind of fish?

Participant 6: sometimes, it's salmon, sometimes, it's cod. That's about it.

Participant 4: Usually, every other day, I eat sandwiches. The Healthy Choice sandwich meat with a slice of fat free cheese. Salad with the lettuce and tomato. And every other day, sometimes, I eat lean pocket or omelet, with eggbeater, and fat free cheese. Every other day, I make a change, and change every other day.

WenYen : what kind of bread do you use for your sandwich?

Participant 4: Well, just not white bread, sometimes, the grain, sometimes the wheat, sometimes, the five seeds bread. Add, a calcium vitamin.

WenYen: the sandwich lunch meat, is that turkey, ham?

Participant 4: Most of the times, are the ham and chicken.

WenYen: Do you use salad dressing on your salad?

Participant 4: No, I don't add salad dressing on mine. And most of the times, are the lettuce and tomato.

WenYen: What kind of lean pocket do you usually eat?

Participant 4: Just the lean pocket, the lean pocket, or the croissant pocket. The square shape kind.

WenYen: are those the ham and cheese or vegetarian pocket? Or pizza pocket?

Participant 4: I don't eat pizza pocket. Sometimes, maybe once in a month, I eat pizza.

Participant 3: I don't have a set patter to eat lunch, I eat very little at lunch time. Most of the times, I eat spaghetti, or Chinese "ghow jin mein". Or sandwich, or stir fry rice, or salad with lettuce, tomato. Dressing is the Chinese sesame oil. Sometimes, the frozen Chinese dumplings. And sometimes, I don't eat lunch.

WenYen: Your spaghetti sauces include?

Participant 3: Ground chicken or beef with spaghetti sauce. And the seafood sauce in my ghow jin mein.

WenYen: Noodle for the ghow jin mein?

Participant 3: spaghetti noodle.

WenYen: stir fry rice? What do you put in your stir-fry rice?

Participant 3: King ten stir fry rice. Add some broccoli or green onion. Sometimes, I add ground beef, ground chicken.

WenYen: What kind of bread do you use with your sandwich?

Participant 3: Sandwich with white bread and low salt kind.

WenYen: do you add spread with your bread?

Participant 3: usually Tuna fish with butter and lettuce, with sandwich bread, sometimes, cabbage, cucumber, and sesame oil or Ranch dressing. And with coffee or tea.

WenYen: And your frozen dumpling, where would you get your frozen dumplings?

Participant 3: From the Chinese grocery store. Sometimes is the chicken with vegetables, and sometimes, it's pork and vegetables.

WenYen: do you put cream or sugar in your coffee or tea?

Participant 3: No, all black.

WenYen: Anything else?

Participant 4: I want to add fruit in my lunch meal.

WenYen: What kind?

Participant 4: Anything in season. Like now, sometimes, I eat grapes, peaches, or nectarine.

WenYen: How about Participant 2? What do you usually eat for lunch?

Participant 2: Usually I get the turkey sandwich around OSU at the 5<sup>th</sup> avenue (25<sup>th</sup>

avenue) . It includes the chopped cabbage, cranberry, and turkey. It's very large, and I eat the half of it and the other half for the next day. Or I get the King Ten stir-fry shrimp noodle. Or won ton soup. There are 12 won tons in one soup, and a lot of noodle and vegetables, and Chinese BBQ meat. I don't eat the BBQ meat, and it's too big, it always for 2 or 3 meals. It's too much. Or not enough soup, I add a little more chicken broth to it for me. Or I buy the $1.09 lunch frozen box, because the handy man eats lunch with me and he likes the steak so I also buy the steak, so everybody can eat. I get it from Cub foods at #13. I don't get the other expensive ones, those are too large. This is just right for me. Other is too large, I can't eat so much and sometimes, I make the carrot soup which include the carrot and chicken leg without skin. Then, I shredded the chicken meat in the soup.

WenYen: do you know what kind of the frozen dinner you get?

Participant 2: Sometimes, I make some vegetables, I make cabbage, broccoli, and green bean. I buy a lot of broccoli. Sometimes, I get some dishes from here (King Ten) and I add some vegetables to it.

Participant 2: Dinner is I make. Stir fry rice. I make one time, I can eat two to three meals. I add eggs to it and oyster sauce in the stir fry rice. Therefore, I don't put salt or soy sauce in it anymore since I put oyster sauce in the rice already. Sometimes, I get fried chicken from the Cub foods, I get the thigh because the size is big even with the bones, bone is still good.

WenYen : anything else?

Participant 2: And salad. Sometimes, I buy the salad from the store, or the kind of the from Cub Foods, it's already made. Sometimes, the crab salad, or plain, cole slaw, most of the time the crab salad. I don't buy the salad with cheese kind. And sometimes, I eat fruit afterwards. Most of the time, I eat grapefruit, because the orange is too dry, I buy grapefruit, and peaches.

WenYen: how about Participant 5.

Participant 5: Very simple because I swim everyday and I am very tired and I buy the ready made sandwich from the store and potato salad, not very good. Drink water.

Participant 2: I drink decaff free coffee. With coffee cream and equal.

WenYen: Participant 5, and your sandwich bread?

Participant 5: the bread I got from the Fred Meyer, the small bread, $0.25, it's delicious. And fruit. Sometimes, I add sandwich spread.

Participant 5: the Alberson's potato salad. And the roast chicken is from the Cub foods. And these three items are usually my lunch and that's about it.

Participant 6: That is very good lunch.
WenYen: And Participant 1?
Participant 1: Do you know about the packet noodle, the Ramen noodles. Nine out of the ten days, I eat the Ramen noodle. I add one egg, and one banana, or orange. Depends on what kind of fruit is on sale.

WenYen: What kind of flavor of the Ramen noodle you eat?

Participant 1: Sometimes is the chicken flavor, sometimes is the pork, but I like the most is the sesame oil include the noodle of the chicken flavor. And I like peanut butter like Participant 6, and I add peanut butter in the noodle soup. It enhances the flavor and I add quite a bit in the soup.

Participant 6: I love peanut butter, specially the chunky peanut butter. Before, I went swimming in the morning, when I get up, I eat grounded sesame seed made into a candy but I make my own without sugar, only the grounded sesame seeds. And I eat fruits all the times. Sometimes the cantaloupe, honeydew, apple.

WenYen: What kind of apple?

Participant 6: I don't like it too sweet. I like the Granny Smith or grapefruit. I almost eat a different kind of fruit everyday.

WenYen: What kind of vegetable do you put in your noodle?

Participant 1: Like the noodle, sometimes the Chinese small green cabbage, depends on the price, if the vegetables are on sale, sometimes I use cabbage, but most of the times are the Chinese small green cabbage.

WenYen: How about dinner? Participant 3, would you like to start first?

Participant 3: Chinese kind of dinner. BBQ chicken, one vegetable, salad with sesame oil like the one in the lunch, and chicken soup with Napa cabbage. Sometimes, stir fry vegetables and sliced chicken meat.

WenYen: What kind of vegetables?
Participant 3: All different kind, sometimes, broccoli, or pepper.
WenYen: do you make your own BBQ chicken or buy it from the store?
Participant 3: I make it my own. I use the chicken leg without skin the simplest way, and add peeled potato and dry Chinese vegetables (mai gan chi). Sometimes I make gow lee chicken.

WenYen : What part of the chicken meat do you use?

Participant 3: I always use chicken leg for soup and chicken breast for stirred fry and with white rice. After dinner, I eat fruit, banana or apple or orange.

WenYen: How about Participant 4?

Participant 4: TV dinner whatever kind is on sale. But sometimes it is not enough to eat, I add a slice of bread, and low fat kind of TV dinner, usually the Healthy Choice. I shop very slow and I read all the nutrition information on the packet. I don't want the high fat one or I don't want the high sodium kind. Also the TV dinner don't have enough vegetables, if I feel like it, I add some broccoli, or if I

don't feel like to cook vegetables, I use the frozen vegetables.

WenYen: What kind of the frozen vegetables?

Participant 4: Whatever is on sale, but most of them are the plain from Birdeye without added cheese, broccoli, pea and carrot, green bean, things like that. Afterwards, I add fruits. Most of the times are bananas, and a glass of milk. I slice the banana and add in the milk and a calcium tablet.

WenYen: skim milk?

Participant 4: Yes.

Participant 3: I want to add after dinner, I take a vitamin C and calcium. In the morning, I take 250 mg of calcium, and I take 750 mg calcium at dinner time.

Participant 4: I drink a lot of water, 8 glasses of water everyday.

Participant 6: I eat oatmeal at dinner, if I am hungry I make a piece of chicken, but always a lot of vegetables, just the fresh ones. Sometimes, I eat by myself, I make tofu and cucumber. I take 3 teaspoon MSM. Maybe, more fruits, sometimes, grapefruits, grapes, peach, orange, plum. Anything is in my refrig. I eat a lot of fruits and vegetables. Sometimes, I eat some peanuts too. I like peanut. Because I don't put a lot of oil in cooking so I eat peanuts. I put cold tofu with garlic with pepper. I like spicy foods with hot hot pepper powder.

WenYen: do you drink anything with your dinner?

Participant 6: I drink orange juice or apple juice every day. I used to drink orange juice, but I change to apple juice because I read something in the health magazine, but I don't like sweet thing. I don't eat sweets but I drink apple juice.

Participant 4: I want to add, sometimes, I add some tofu in my TV dinners, sometimes, I eat MandeeCan fat free fish or Tyson fat free chicken. Or I add 97% fat free chicken strips in my TV dinners when I get tired of it.

Participant 3: I eat fish once a week, most of the times are on Friday. Sometimes is salmon and sometimes is mathod (?).

Participant 1: you like the Americans, eat fish on Fridays.

Participant 3: Can you eat tofu right out of the pockets without cooking? Normally, I steam it and eat it cool.

Participant 1: I eat the fresh tofu every Thursdays.

Participant 1: My dinner is not set pattern. Whatever I have in the refrig. I live alone and I cook whatever I like. Yesterday, I put lobster and dry vegetables, Chinese Chi, lobster chips and stir fry noodle. The day before, I make stir fry noodle and like chow jin main, add ground pork, Chinese chi, green onion and BBQ, this I can eat for three days. If I can not finish, I freeze some of the portion and the third day, I eat it again. The noodle is Ramen noodle.

WenYen: anything else?

Participant 1: the meat dumpling frozen and bought from the grocery store. Stir fried rice, stir fry noodle or the soup noodle from the lunch. I like ice cream and I eat it after dinner.

WenYen: What kind?

Participant 1: every kind of flavor, I like. Sometimes, I buy the BBQ chicken from Cub foods. One lemon herb chicken, I can eat for six days.

Participant 5: I eat soup noodle at night. Most of the time, it's chicken noodle soup at dinner, sometimes stir-fry noodle, or sticky noodle, with Chinese sausage, with dry shrimp and mushroom. But it's too oily.

Participant 1: her stir-fry noodle is very good.

Participant 5: Like chow jin main, but the sauce is different, I bought it from the

Chinese grocery store, something is spicy with sauce with ground pork. I don't eat beef. I only eat pork, and fish. I only like chicken breast, not leg.

WenYen: what kind of noodle?

Participant 5: from the Chinese grocery store. The 5# per package, flat and white noodle.

WenYen: your fish?

Participant 5: Salmon.

WenYen: your vegetables?

Participant 5: the Napa cabbages, and carrot, and cauliflower.

WenYen: Drink anything?

Participant 5: from the soup. I don't drink coffee.

Participant 6: She adds three packets of tea bags in her tea, too much.

Participant 5: I don't do that anymore after you say that to me. I don't like the powder coffee either. And soy bean.

Participant 6: I make my own soy bean with pepper with soy sauce.

WenYen: Participant 2, you have already told me your dinner. Do you have anything to add?

Participant 2: I usually eat rice and chicken flavor noodle, only cook for 3 minutes, and add one egg and if I have egg at lunch, I don't eat egg at dinner. Only one egg a day.

WenYen: how about snacks?

Participant 3: cake without frosting about 1 square inches, or baked sweet potato.

Participant 4: I don't like sweets, I eat breakfast, lunch, and dinner and the fruits.

Participant 1: I eat a lot of snacks, soy milk. And soy milk with candy, cookies, potato chips, or peanuts or whatever I see in the house.

Participant 6: I like corn, soy bean, dry fruits, dry plum, dry apple, raisin, I make those myself. Sesame seed chip, like potato chips but it's Chinese way. I don't like

cake. Sometimes, apple pie, only once in a while.

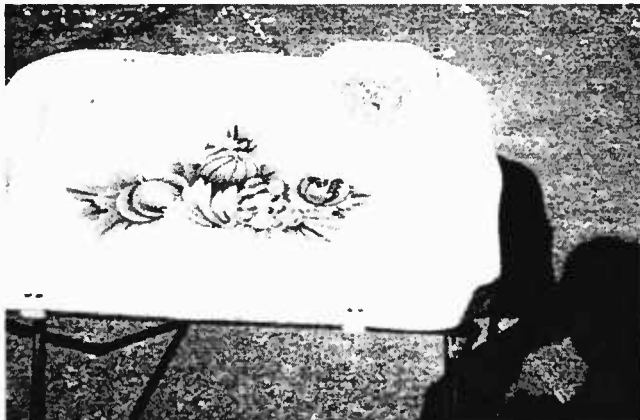Participant 4: Sometimes, I snack on crackers. But only with the low sodium kind.

WenYen: is there anything you want to add? (silent), Thank all of you for being here.
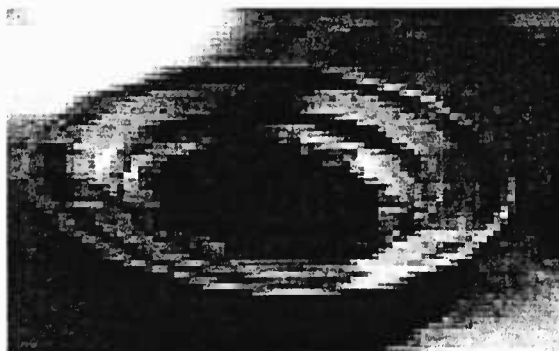
Appendix 11

Unsuccessful Chinese Food Photos
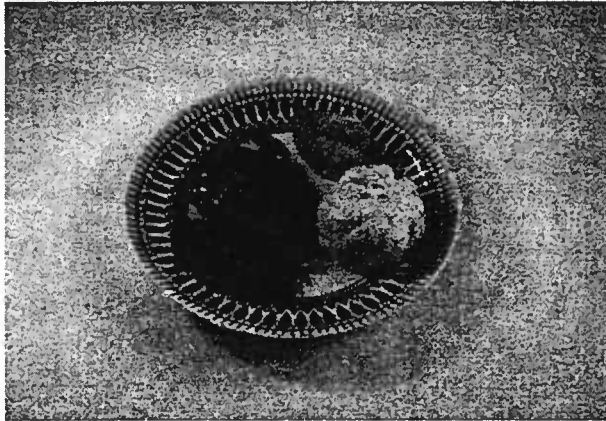
Serving size was not correctly used and photo was underexposed.



Incorrect distance was selected for taking food photo. Shadow was shown at the background of the food item. The food item was unable to identify from the photo.



The photo taking distance was too close. Food item was taken with busy background and the photo was underexposed.

Appendix 12

Successful Culturally Specific Food Photos
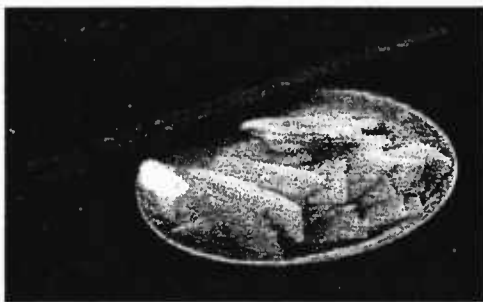
1/2 cup of bamboo shoot (1 serving)


1/2 cup of dried mushroom (1 serving)


3 oz dried fish (1 serving)
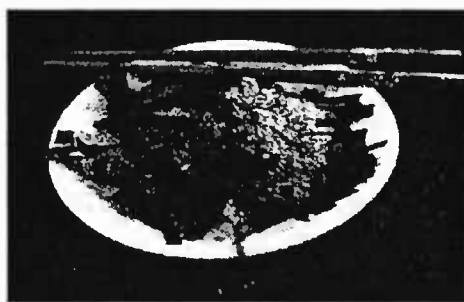

1 cup dried seaweed (1 serving)


1 thousand-year egg (1 serving)


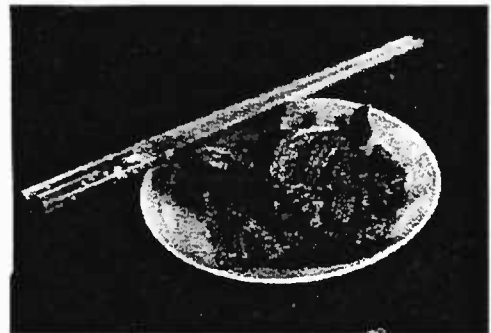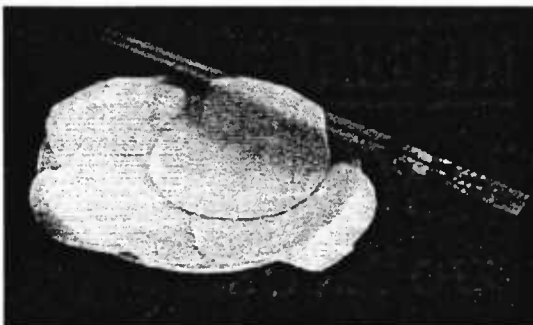3 oz dried shrimp (1 serving)
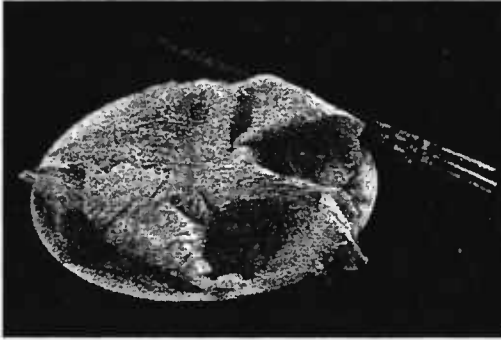
3 oz tofu skin (1 serving)
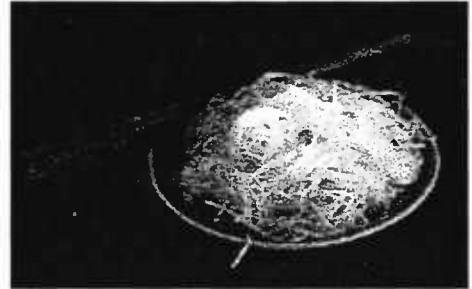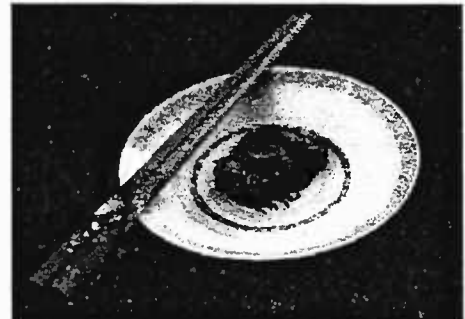


1 cup rice noodle (2 servings)
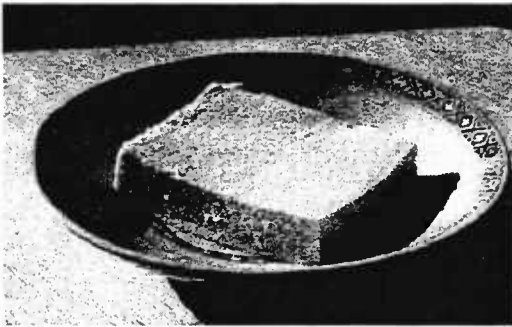


3 oz tofu (1 serving)



3 oz roasted el (1 serving)



4 dumpling wrappers (1 serving)



1 tablespoon miso