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Knowledge of Cardiovascular Health Among Chinese, Korean and Vietnamese Immigrants to the US

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Abstract

Cardiovascular disease (CVD) is the leading cause of death among Asian Americans, the majority of whom are foreign-born. However, CVD and risk factor data is sparse for specific Asian immigrant populations. To assess knowledge and understanding of CVD and risk factors within Chinese, Korean and Vietnamese immigrant populations, we conducted eight focus groups of 77 participants between 36 and 84 years old. Participants correctly identified signs and symptoms for heart attacks while knowledge about stroke was incomplete. While poor diet, lack of exercise, older age, and high cholesterol were frequently discussed as risk factors, mechanisms perceived as contributing to heart disease were influenced primarily by non-Western paradigms. Non-Western remedies were discussed in detail among Chinese and Vietnamese participants. All participants desired more information, and identified barriers to effective communication with healthcare

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providers. A deeper understanding of beliefs and barriers faced by Asian immigrants can help guide health promotion efforts.

Introduction

Asian Americans are one of the fastest-growing minority groups in the US, with the population increasing from over one million in 1970 to nearly seven million in 1990, and projected to exceed 16 million by 2010 [1, 2]. An estimated 69% are foreign-born, with most arriving in the US within the past 20 years [3, 4]. Between 2004 and 2005, immigration accounted for over half of the total population increase in the US [5].

Although the age-adjusted death rate from heart disease among Asian Americans is lower than most other racial and ethnic groups, cardiovascular disease (CVD) remains the leading cause of death among Asians in the US [6]. Between 1996 and 2000 in King County, Washington State, mortality due to heart disease among Asian and Pacific Islanders was high, with age-adjusted average annual deaths totaling between 266 and 282 per 100,000 [7]. Despite these elevated rates, CVD prevalence and risk factor data remains sparse for specific Asian ethnic populations, particularly among immigrants. A review of the literature yielded several studies assessing knowledge regarding CVD and its risk factors among Korean [8–11] and Vietnamese immigrants in the US [12–14] whereas studies among Chinese American immigrants are lacking. Given this lack of ethnic group-specific data, we undertook an ethnographic study to assess knowledge, understanding of CVD among three predominant Asian American immigrant populations: Chinese, Korean and Vietnamese immigrants. This project is part of a larger study to understand CVD in underserved populations [15].

Methods

In 2006, we conducted eight focus groups in Seattle, Washington among Chinese, Korean, and Vietnamese immigrants. We aimed to recruit between 8 and 10 participants per focus group and to conduct two focus groups per language (i.e., Cantonese, Mandarin, Korean, Vietnamese). We used a convenience sampling method to recruit Chinese participants from health clinics, Korean participants from a church, and Vietnamese participants from a community service agency. Recruitment was done in participants' native language since most subjects did not speak English proficiently. The University of Washington Institutional Review Board approved all study procedures.

We developed field guides to gather information on participants' beliefs, experiences, and knowledge of CVD concepts, including heart disease, stroke, high blood pressure, and high cholesterol. The guides were semi-structured to ensure consistency between facilitators yet allow flexibility to uncover topics presented by participants. CVD concepts were written to be appropriate to each ethnic group's language and belief system. Facilitators were

bilingual in participants' native language and underwent standardized training. Focus groups were conducted at a health clinic for Chinese groups, a church for Korean groups, and a community center for Vietnamese groups. Focus group sessions lasted 1.5–2 hours and were audio-recorded by the facilitator while another research staff took notes. Informed consent and basic demographics in participants' native language were obtained prior to discussions. We transcribed and translated the tape-recorded focus groups sessions into English transcripts.

We analyzed the data using content analysis by which large amounts of text representing similar meanings are classified into categories (or themes) [16, 17]. Each member of the research team (ST, MY, KL, TT, MS) completed detailed coding of the transcripts and three members of the team met to discuss emerging themes, clarify cultural issues, and establish higher-level conceptual categories for each transcript. When areas of misunderstanding or discrepancy were identified, researchers reviewed original transcripts and discussed until consensus was achieved. Quotations were abstracted from transcripts to illustrate findings on these themes.

Results

Participant characteristics are summarized in Table 1. A total of 77 participants were included in 8 focus groups, with Mandarin participants representing the largest group (*n* = 25). Participants' ages ranged from 36 to 84 years and a majority was women (64.5%). The mean number of years of education was highest for Koreans (14.5 years) and lowest for Vietnamese (4.2 years). The proportions of self-reported hypertension and high cholesterol differed across ethnic groups, with the highest among Vietnamese participants.

Knowledge of Signs, Symptoms, Mechanisms and Consequences of Heart Disease

A summary of concepts that emerged regarding signs, symptoms, mechanisms and consequences of each of the four health conditions (heart disease, stroke, high blood pressure, high cholesterol) is provided in Table 2. "Irregular or fast heartbeat", "difficulty breathing", and "dizziness" were mentioned by all groups when discussing heart disease. However, Vietnamese and Korean participants identified the most symptoms. As one Vietnamese man expressed: "*This heart disease has a lot of diseases: a weak heart is heart disease. Heart pain is heart disease. You see, suffocation is also heart disease. Everything is heart disease.*" Chinese participants believed that heart disease is caused by "defective or damaged heart", "valves or ventricles [not closing]" and "weak heart". Korean participants identified "fast heart beats", "high elevation" as among the mechanisms of heart disease. Mentioned in the Vietnamese group were "frozen blood", "high elevation" and "weak heart" as contributing to heart disease. "Blockages in vessels in heart" was identified by the Korean and the Vietnamese groups as the cause of heart disease. While participants generally recognized that heart disease can lead to "heart problems", "heart attacks", or "surgery", Korean and Vietnamese participants, in particular, discussed the life-threatening nature of heart disease.

"Paralysis or numbness" and "asymptomatic" were mentioned by all groups when discussing strokes. "Sudden collapse" was mentioned in the Cantonese and Korean groups.

All four groups discussed "blockage of vessels in the brain" as a mechanism of stroke; other mechanisms are cited in Table 2. "Paralysis" and "death or sudden death" were mentioned by all groups as consequences of stroke.

When asked about signs and symptoms of high blood pressure, Cantonese, Korean, and Vietnamese participants emphasized the asymptomatic nature of high blood pressure which can be known "only by measurements". Visible signs and symptoms included blurred vision, discomfort, and dizziness. Signs and symptoms were discussed heavily in the Cantonese group and minimally in the Mandarin group. When asked how high blood pressure occurs, the Vietnamese group described having "too much or not enough blood" whereas the Korean group conversely stated that high blood pressure is "not associated with amount of blood." Death was mentioned in all groups as a potential consequence of high blood pressure. Whereas Mandarin, Korean and Vietnamese groups identified the components of the circulatory system as being affected by high blood pressure, the Cantonese group also identified stomach and kidneys. Signs and symptoms for high cholesterol were discussed only by Korean participants, who cited "blood is black or dark," "blood is not clear," and having "high [levels of] oil in the blood from fat intake". Other groups did not offer any examples when asked about signs and symptoms of high cholesterol. When asked what causes high cholesterol, the Vietnamese group said "fat in blood". Examples of consequences of high cholesterol were primarily provided by the Vietnamese and Mandarin groups, and included "thickens blood", "blocks flow of blood", "death", and "fatigue" (Table 2).

Risk Factors and Their Associated Mechanisms

Exercise and lifestyle characteristics were discussed primarily within the context of heart disease, stroke, and high blood pressure but not high cholesterol. Korean and Chinese groups discussed having an unbalanced American lifestyle as contributing to heart disease because it causes one to "drive all the time", be unable to balance "work and family life", not exercise, become obese and have stress. A Chinese participant said, "*Why many young people develop heart disease? Because for their jobs or families, they work day and night and do not have any rest…. Young people fight hard for their American dream. So there are cases that young people develop heart disease.*" All but the Cantonese groups identified smoking as a risk factor for heart disease and stroke. All groups believed that lack of moderation in exercise leads to heart disease potentially by keeping the "blood stagnant", causing lipid build-up, or by causing the heart to "work too much".

In general, an unhealthy diet was discussed across all ethnic and language groups as a risk factor for all four CVD conditions. "American food", "fat", "grease", and "meat" (e.g., "McDonalds," "fried foods") were specifically identified. Salt, as found in such cultural foods as "shrimp paste, soy sauce, and sausages" was discussed as a risk factor for heart disease, high blood pressure and high cholesterol. Meats such as "beef, pork, and chicken" were thought to increase the risk of heart disease, stroke, and high blood cholesterol because they were perceived to contain "too much blood" and were therefore perceived to be "too nutritious" to be healthy. Inadequate dietary intake and moderation were also identified as reasons why diet is a risk factor.

All ethnic groups identified high cholesterol as risk factor for heart disease and stroke. Participants recognized that cholesterol increases fat build up, which in turn blocks circulation. Seafood was identified as an example of food with high cholesterol. Similarly, high blood pressure was commonly identified as a risk factor for heart disease and strokes by participants.

Older age was commonly mentioned as a risk factor for heart disease, stroke, and high blood pressure. "Lack of exercise", and "thinking too much" were provided as mechanisms by which older age affects risk of heart disease. According to one Korean participant, "*People who use [their] brain a lot will get heart disease.*" For stroke, aging was akin to having "more miles [on] a car" at which time "organs become fragile". For high blood pressure, older age was considered a risk factor because "blood vessels get harder". Age was not specifically mentioned as a risk factor for high blood cholesterol in any groups.

Mental and emotional states were commonly discussed among participants across all groups within the context of all CVD conditions. In general, participants from all ethnic groups believed that negative emotions such as anxiety, fear, nervousness, and frustration "burden[ed] the heart", caused the heart to "beat faster", or to "hurt the intestines". In particular, Vietnamese participants believed that "think[ing] too much" can lead to heart disease and high blood pressure. Korean participants mentioned other mental states such as being "introverted" or "lacking motivation" to cause the heart to beat "irregularly" or "to pound". According to a Korean participant, the inability to express feelings to others especially during hardship can lead to heart disease: "*Personality is also important. Women will get heart disease if they don't talk outside...*". The suddenness of emotions emerged from the Cantonese, Korean and Vietnamese groups as a risk factor for high blood pressure. Stress was also commonly mentioned as risk factor for heart disease, high blood pressure and high cholesterol.

All groups discussed weather elements as risk factors for CVD conditions. "Air pressure" changes, or "sudden weather changes", and extreme conditions such as cold temperatures or hot and humid weather were mentioned as risk factors for heart disease, stroke and high cholesterol. Specifically, Cantonese participant believed that air pressure changes can lead to "chest pain" whereas Mandarin, Korean and Vietnamese participants believed that cold temperatures "solidif[y] fat" within the blood and can lead to high cholesterol. One Korean noted that, "*According to an old proverb, people will get drooled lip after sleeping on a cold pillow.*" Hot weather was seen to help "the fat in your system melt away". Other mechanisms of weather are summarized in Table 3.

Prevention

Diet and exercise were uniformly discussed in all groups as ways to prevent heart disease, stroke, high blood pressure and high cholesterol. Dietary prevention methods included controlling food portion, avoiding specific foods with high salt or fat and that were "too nutritious", and eating more healthy foods such as vegetables and fish. Walking was most commonly used as an example of exercise that can help prevent CVD. As examples of other ways to exercise, Korean participants mentioned dance and calisthenics, and Chinese participants cited *tai chi*. Vietnamese participants believed that sweating was the primary

mechanism of preventing high cholesterol, namely by causing fat to "come out in sweat". Participants also discussed exercise frequency ("daily or regularly") and moderation ("avoid overexertion"). "Regular or routine check-ups" were commonly mentioned by all groups, with positive attitude, balance, and relaxation as other ways participants believed could help prevent heart disease, stroke and high blood pressure. Lack of moderation in diet, exercise and lifestyle was commonly cited as reasons for increased risk of health problems. Conversely, methods to prevent heart disease included avoiding overconsumption of food and foods that are "too nutritious", excessive or inadequate amounts of exercise, imbalance of work and family life, and extreme temperatures.

Non-Western Beliefs

Non-western health beliefs were woven throughout participant's understanding of disease, risk factors, associated mechanisms, and methods of prevention. Prevention of high cholesterol centered around the concept of movement or keeping "the blood running". "Frozen blood" cited by Vietnamese participants as a mechanism of heart disease evokes the image of stopping circulation whereas "thick blood", as mentioned by a Korean participant, would appear to slow it down. When asked why lack of exercise contributes to heart disease, Vietnamese participants reasoned that lack of exercise causes the blood to stay in one place. The hot and cold paradigm was also used in several focus groups to discuss health. Participants in the Mandarin group discussed *liang* (cold/dampness) and *re* (heat) in relation to high cholesterol.

All cultural groups acknowledged herbal or home remedies to control hypertension or hypercholesterolemia, and to prevent heart disease and strokes (Table 4). The Cantonese group cited the most remedies in preventing high blood pressure, including celery, herbs, cilantro, ginseng, snake extract and others. The Vietnamese group described how vegetable juice and herb concoctions (*rau húng quê* [asian basil], *rau dâp cá* [chameleon], *tía tô* [purple perilla], *tân ô* [garland chrysanthemum] and lemon) can quickly reduce high blood pressure and abate symptoms of dizziness, lightheadedness, blushing, or weakness and fatigue. Traditional Chinese health beliefs emerged in the Mandarin focus group with the construct of "*yang* forces in the liver rising up and leading to stroke." Non-western prevention methods were most commonly provided by the Cantonese and Mandarin groups. The Korean group mentioned acupuncture for prevention of high blood pressure, ginseng for prevention of stroke, and fish oil and *fructose creatgi* for prevention of high cholesterol.

Barriers

Focus group participants described several barriers to health promotion and care. Within themselves, participants acknowledged a sense of fatalism as a barrier to prevention. A Vietnamese participant explained, "*When people get old, they have a different concept. The concept is that you won't live much longer, you should eat without worries, so no need to limit your diet anymore.*" Many obstacles centered on healthcare providers, with each group stating that doctors and nurses do not have enough patience or time to explain things, or are too busy. Participants were frustrated because their providers do not provide education on heart health unless they ask. This was felt for both Western providers and for doctors within specific ethnic groups who do not share language or culture. Other barriers

included cost of care, stigma of being on welfare and not wanting doctor to know, and shy personalities. Some participants discussed how translation and interpretation services do not resolve cultural barriers between patients and providers, discouraging them from seeking further information. As explained by a Vietnamese participant, interpretation provides only simple information and limited opportunity to elaborate on important details, whereas direct translation of health promotion materials which cite Western foods or activities as examples is not helpful because such translated examples are not culturally relevant.

Discussion

We observed certain patterns that provided important insight into understanding how Chinese, Korean and Vietnamese immigrants perceive CVD. First, participants more completely discussed signs and symptoms for heart attacks than for stroke. In discussing heart disease, symptoms identified by participants included "chest pain", "discomfort in heart", "dizziness", and "fainting". Although all cultural groups acknowledged visible signs of stroke such as paralysis, sudden collapse, and chest pain, no mention was made about other stroke symptoms such as trouble speaking, blurred vision, droopiness, weakness, decreased level of consciousness or sudden confusion. Previous studies document low levels of knowledge among several Asian immigrant populations. A qualitative study of 61 Vietnamese residents of Philadelphia reported that less than 25% of participants were familiar with heart disease [14]. In a population-based survey of 4,254 randomly selected Vietnamese residing in Santa Clara County, California, knowledge of signs and symptoms for both heart attacks and stroke was limited. Only 5% of respondents could correctly identify all five correct symptoms of heart attack, and only 22% for symptoms of stroke [18]. Studies among Korean immigrants also documented low levels of knowledge. The majority of participants in a convenience sample of approximately 120 Korean immigrants in Chicago and its suburbs could only identify one risk factor and five out of ten symptoms for heart attacks. Knowledge about stroke ranged from low to moderate [9, 10]. The few studies that have assessed knowledge of CVD among Chinese immigrants were conducted in Canada [19, 20]; similar studies among Chinese immigrants in the US are lacking.

While participants were able to identify important symptoms of heart attacks, knowledge regarding underlying mechanisms of heart disease was not always accurate. For instance, participants often attributed heart disease to "defective or damaged heart", "high elevation", and "frozen blood". The fact that these attributions of heart disease are incorrect underscores the challenges that the Western biomedical community faces in presenting health information to these Asian ethnic groups. Even when participants are able to identify risk factors that appear to fit reasonably well with the Western biomedical model, a deeper exploration reveals strong beliefs driven by non-Western ideas. For instance, lack of exercise and high cholesterol levels were commonly identified as risk factors for heart disease and stroke. However, participants' explanations for how such factors contribute to CVD heavily underscore the influence of non-Western concepts on their understanding of the disease process. Moderation or balance, for instance, was often mentioned as a theme for managing risk factors. Exercise was considered most effective in preventing CVD when performed in moderation rather than in excessive or inadequate amounts. Similarly, diet must be nutritious, but foods that are "too nutritious" were viewed as harmful. Others viewed a

healthy diet as a balance of two polarized forces (*yin* and *yang*), such as hot and cold forces—a concept that is rooted in a non-Western paradigm of health [21]. Avoiding extreme weather and temperatures may stem from the need to maintain a balance of hot and cold or the need to seek moderation. Participants also believed that health was maintained by the regular movement or circulation, in this case, of blood. For instance, blood viscosity was thought to be responsible for heart disease. In a similar way, participants believed that lack of exercise contributes to heart disease due to the lack of blood flow or to blood becoming stagnant. These views reflect the ancient non-Western belief that disease or ill-health occurs when *yin* and *yang* are imbalanced or when the flow of *qi* (vital energy) through the body becomes imbalanced [22]. Participants also believed the mind has an important and direct connection to cardiovascular disease, with mental stress from thinking too much, introverted personalities, and lack of motivation discussed within the context of high CVD risk. This holistic connection between mind and body is an ancient belief common in many Asian cultural groups [23]. Thus, prevention or treatment of illness is viewed in terms of maintaining or restoring the balance and harmony of *qi* flow and *yin-yang* balance.

Other interesting underlying concepts emerged. For example, while heart disease and stroke were commonly accepted as age-related conditions, some attributed the process of "thinking too much" at an older age as ultimately responsible for heart disease and stroke. Although all groups identified exercise as an important method of prevention, the precise mechanism was thought to be the process of "sweating out fats and toxins through pores in the skin". Such examples emphasize the importance in exploring knowledge at a deeper level than what has been typically assessed.

All participants wanted more accurate information than what they currently receive from their medical provider. Barriers listed by participants represent challenges on the individual level (i.e., fatalism, language, stigma, lack of confidence) as well as on the healthcare system level (e.g., healthcare providers do not have enough time or patience), suggesting that barriers to effective prevention and management involve complex dimensions.

A number of limitations in this study should be noted. First, coding from transcripts that were translated from the original language into English represents a potential source for errors, not only within each language group but also across groups. Medical or technical terms, in particular, may be difficult to precisely translate between languages, and idiosyncratic or nuanced meanings may become lost in translation. As a result, our analysis would miss such discrepancies that may exist between languages. For example, participants seldom clearly differentiated between heart disease, as an underlying pathologic process, and heart attack, as a distinct acute event. It is unclear whether this lack of distinction stems from participants' lack of knowledge or from inability to precisely translate these terms into the corresponding native languages. Second, the lack of mention of a particular issue during the focus groups does not equate to lack of knowledge, but rather, could reflect the topic not taking precedence within the group discussion. Third, our results are not expected to be entirely representative of each cultural group since participants were recruited using convenience sampling. The median age of participants in our sample, for instance, is older than that of the Asian population in the US (36.7 years) and in Seattle (38.1 years) in 2009 [24]; furthermore, all participants in our sample are foreign-born. Therefore, responses from

this study do not reflect those of younger Asians born in the US or in Seattle. However, our study and sampling methods were designed to explore important concepts rather than attain accurate representation of all Asian American immigrants. Finally, immigrants are a heterogeneous group whose level of acculturation can vary widely. Our sample represents only those whose English proficiency is limited, and by proxy, whose level of acculturation are not representative of all immigrants.

Despite these limitations, findings from this can help guide future health communication and interventions to more effectively promote health within these unique populations. First, individual barriers cited by participants such as stigmatization and language barriers continue to present obstacles for Chinese, Korean and Vietnamese immigrants. Furthermore, the translation of health materials requires concomitant translation of culture. For example, messages promoting Western foods or activities that are not culturally relevant are not effective even when translated into native languages. Effective health messages must represent translation of culture as well as words. Second, greater effort can be focused on providing more education on signs and symptoms of strokes. Participants in our study were not aware of many of the signs and symptoms of strokes other than paralysis or headache. Third, the ability to identify risk factors for CVD as defined by the Western biomedical model does not necessarily negate the existence of a strong influence of non-Western paradigms. Healthcare providers may be able to more effectively engage this population by acknowledging and communicating health concepts within a belief system that entails notions of balance, moderation, energy flow, and the prolific use of home remedies.

Conclusions

Our study provides information on the knowledge and beliefs of three predominant Asian American immigrants groups in Seattle, Washington, namely Chinese, Korean and Vietnamese immigrants. In particular, although risk factors are commonly recognized by these populations to contribute to CVD, discussions of their underlying mechanisms reveal strong influences by non-Western paradigm on the understanding of disease prevention and management. Healthcare providers may be able to more effectively engage this population by acknowledging and communicating health concepts within a belief system that entails notions of balance, moderation, energy flow, weather and the prolific use of home remedies.

Acknowledgments

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Table 1

Demographic characteristics of subjects in focus groups, stratified by ethnicity

Characteristic	Ethnicity			
	Cantonese	Mandarin	Korean	Vietnamese
Total number (*n*)	17	25	18	17
Male, *n* (%)	7 (41.1)	6 (25.0)	5 (27.8)	9 (50.1)
Age in years, mean (SD)	63.5 (10.6)	65.0 (12.7)	56.9 (7.1)	69.5 (8.8)
Years of education, mean (SD)	9.6 (5.0)	13.9 (2.2)	14.5 (2.3)	8.9 (4.2)
Marital status, *n* (%)				
Single	0 (0.0)	4 (16.7)	0 (0.0)	4 (23.5)
Married	17 (100.0)	18 (75.0)	17 (94.4)	10 (58.8)
Divorced	0 (0.0)	0 (0.0)	0 (0.0)	2 (11.8)
Widowed/Widower	0 (0.0)	2 (8.3)	1 (5.6)	1 (5.9)
Has hypertension, *n* (%)	10 (62.5)	10 (45.5)	1 (5.6)	10 (66.7)
Has high cholesterol, *n* (%)	5 (31.3)	12 (54.6)	5 (27.8)	12 (75.0)

Table 2

Signs, symptoms, mechanisms and consequences identified by subjects for four health conditions, stratified by ethnicity and language, Seattle, Washington, 2008

	Ethnicity			
	Chinese		**Korean**	**Vietnamese**
	Cantonese	**Mandarin**		
Heart disease				
Signs and symptoms				
Difficulty breathing			X	X
Chest pain			X	X
Heart aches				X
Discomfort in heart		X		
Irregular or fast heartbeat	X	X	X	
Mouth can't talk				X
Dizziness			X	X
Fainting			X	
Arms and legs become hard				X
Trouble sleeping			X	
Don't know		X		
Mechanisms				
Blockages in vessels in heart			X	X
Defective or damaged heart	X			X
Heart beats fast			X	
Valves or ventricles don't close	X	X	X	
Weak heart		X		X
Frozen blood				X
High elevation			X	X
Consequences				
Heart attacks			X	
Heart problems		X	X	
Surgery				X
Life-threatening				X
Death—sudden or within an hour			X	X
Stroke				
Signs and symptoms				
Paralysis, numbness	X	X	X	X
Headache	X			
Pain in occipital area			X	
Sudden collapse	X		X	
Asymptomatic	X	X	X	X
Don't know	X			
Mechanisms				

| | Ethnicity | | | |
| | Chinese | | Korean | Vietnamese |
	Cantonese	Mandarin		
Blockage of vessels in brain	X	X	X	X
Blood vessels in brain get bigger			X	
Brain hemorrhage; vessels break	X	X	X	X
Lack of oxygen			X	
Not associated with heart			X	
Associated with heart		X		
Consequences				
Death, or sudden death	X	X	X	X
Paralysis	X	X	X	X
High blood pressure				
Signs and symptoms				
Blurred vision	X			X
Dizziness	X			X
Face turning red without headache	X	X		
Headaches and fatigue				X
Pain or discomfort	X		X	X
Strong pulse			X	
Tremor	X			
Asymptomatic	X		X	X
Mechanisms				
Too much or not enough blood				X
Not associated with amount of blood			X	
Consequences				
Affects heart	X			
Heart more burdened	X	X		
Stroke	X			X
Interrupt blood circulation	X		X	X
Vessels become fragile		X		
Affects kidneys	X			
Stomach problems	X			
Fainting				X
Suffering		X		
Pain and discomfort			X	
Death	X	X	X	X
High cholesterol				
Signs and symptoms				
Blood is black or dark			X	
Blood not clear			X	
Difficulty breathing			X	

	Ethnicity			
	Chinese		**Korean**	**Vietnamese**
	Cantonese	**Mandarin**		
Only by measurements			X	
Mechanisms				
Fat in blood				X
Consequences				
Blocks blood flow		X	X	X
Thickens blood		X		X
Heart can't beat				X
Heart attack				X
Fatigue		X		X
High blood pressure	X			
Organs don't function well				X
Stroke		X		
Dangerous				X
Death		X		X

Table 3

Risk factors and their associated mechanisms for heart disease, high blood pressure, high cholesterol, and stroke as identified by subjects, stratified by language group, Seattle, Washington, 2008

Risk Factor	Example	Mechanism	Heart Disease				Stroke				High Blood Pressure				High Cholesterol			
			C	M	K	V	C	M	K	V	C	M	K	V	C	M	K	V
Lifestyle																		
American	Drive all the time	No exercise, get fat, stress	X	X							X								
Imbalance	Work and family life		X								X								
Smoking				X														
Exercise																		
Lack		Increases blood pressure	X	X	X	X	X		X	X			X	X				
Lack of moderation	Too much and not enough	Blood stays in one place, easily builds up lipids, heart works too much	X	X		X	X			X		X	X					X
Diet																		
Alcohol	Any	Destroys heart	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
Alcohol	Too much	Get angry					X		X									
American food	McDonalds	Too much fat and grease		X	X	X					X	X	X	X				
Fat	Pork	Fat freezes, surrounds heart, affects blood vessels		X	X	X			X	X				X	X		X	
Fat or grease		Related to and affects high blood pressure							X	X								
Grease	Fried foods	Leads to high oil levels in blood; blood becomes unclear									X		X		X			
Meat	Beef, pork, chicken	Too "nutritious", increases blood pressure			X	X			X		X				X		X	
Meat		Too "nutritious", types of food with too much blood						X		X				X				
Not controlling								X		X								
Not in moderation																		X
Salt	Sausages, shrimp paste, soy sauce	Increases blood, disturbs heart, contributes to atherosclerosis				X	X				X			X				
Sugar																X		
Other	Sweets, soda, starch, rice, water, coffee			X	X													
Cholesterol																		
Bad		Fat builds up and blocks circulation	X	X	X	X	X	X				X			X			
High	Seafood	Obstructs blood flow in vessels; blood gets thin, vessels narrow; blood gets thick	X	X	X	X	X	X	X	X								X

Risk Factor	Example	Mechanism	Heart Disease C	M	K	V	Stroke C	M	K	V	High Blood Pressure C	M	K	V	High Cholesterol C	M	K	V
Blood pressure																		
High		Disturbs heart, forces heart, heart works harder, makes nervous, heart; beats faster and can "break"	X	X	X	X	X	X	X	X								
High		Vessels break in brain, more likely to get angry					X	X	X	X								
Atherosclerosis																		
Blood vessel Disease			X	X	X													
Body weight																		
High	Obese	Fat surrounds cardiac muscles, pressure on heart	X	X	X	X		X										
Age			X					X										
Older		Lack of exercise		X	X	X	X	X	X	X								
Older		Thinking too much			X	X		X		X								
Older		Organs become fragile, more susceptible to falling, slower, more "miles" like a car	X		X	X		X	X	X								
Older		Blood vessels get harder; blood pressure increases with age									X							
Knowledge			X															X
Lack	Measurements	No technology in native country	X															
Lack		No distinction between good or bad cholesterol																X
Mental state																		
Mental state	Think too much	Heart beats irregularly, heart beats more or pound, affects sleep	X	X	X	X			X		X		X	X			X	
Personality	Introverted, lack of motivation		X		X	X			X									
Stress		Can't move well, causes frustration, can't get energy	X	X	X	X				X								
Stress	Emergencies	Blood pressure goes up									X		X					
Stress		Increases cholesterol															X	
Emotions																		
Negative	Anxiety, fear, nervousness, frustration, worry, melancholy, fatalism, lack of patience	Fear weakens and burdens heart, heart beats faster	X	X	X	X	X	X	X	X	X		X	X				
Negative	Worry, fear	Hurts intestines	X	X	X	X		X	X	X				X				

Risk Factor	Example	Mechanism	Heart Disease				Stroke				High Blood Pressure				High Cholesterol			
			C	M	K	V	C	M	K	V	C	M	K	V	C	M	K	V
Sudden	Nerves, anger, frustration, sudden excitement, joy, fear	Causes high blood pressure	X	X	X						X		X	X			X	X
Weather																		
Air pressure	Changes	Leads to chest pain	X					X										
Extreme	Cold	Make body cold; solidifies fat; person less active			X			X									X	X
Sudden								X										
Other																		
Asthma	High elevation		X	X	X	X					X		X				X	
Constipation		Can rupture a vessel		X														
Environment		Interacts with genetics									X							
Family size	Large																X	
Fatigue												X						
Genetics	Family history	Even if person is vegetarian; cholesterol released from liver, not from foods	X							X	X				X			
Non-compliance	Medications										X							
Race	White										X							
Stomach problems											X							
Travel												X						
War		Lack of healthcare access, stress from trauma				X												
Yang forces	Increases	Raise heat in liver							X									

Table 4

Prevention of heart disease, stroke, high blood pressure and high cholesterol as identified by subjects, stratified by ethnicity, Seattle, Washington, 2008

Prevention	Heart Disease				Stroke				High Blood Pressure				High Cholesterol			
	C	M	K	V	C	M	K	V	C	M	K	V	C	M	K	V
Diet	X	X	X	X		X	X	X	X	X	X	X	X		X	X
Control diet									X	X	X	X				
Control food portion		X	X				X	X								
Avoid alcohol and smoking															X	
Avoid egg yolks															X	
Avoid salty foods (soy sauce)	X	X							X		X	X				
Avoid foods with animal fat	X	X		X								X	X		X	X
Avoid hot foods											X				X	X
Avoid ingredients that are "too nutritious"				X			X									
Eat less sugar									X							
Eat less fried foods	X		X						X		X					
Eat less meat	X		X													
Eat more vegetables	X		X	X					X							
Eat more fruits							X									
Eat big fish; avoid small fish		X														
Consume soups	X															
Use olive oil																X
Drink water			X													
Exercise	X	X	X	X	X	X	X	X	X	X	X	X			X	X
Walk	X	X	X	X	X	X	X	X	X	X	X	X			X	
Dance			X			X					X					
Calisthenics			X													
Daily or regularly	X	X	X													
Avoid overexertion	X	X	X													
Tai Chi	X	X				X										
Stationary bikes											X					
Sweat																X

Prevention	Heart Disease				Stroke				High Blood Pressure				High Cholesterol			
	C	M	K	V	C	M	K	V	C	M	K	V	C	M	K	V
Lifestyle																
Decrease stress	X	X	X	X	X				X	X	X	X	X		X	X
Regular check-ups	X	X		X	X				X			X	X		X	X
Get fresh air				X								X				X
Pray			X	X									X			X
Mental and emotional state	X	X	X	X			X	X	X	X	X		X		X	X
Don't get angry										X						
Avoid negative thoughts				X												X
Keep mind relaxed								X			X					
Have self-love			X													
Have positive attitude			X													
Stay balanced	X	X	X													
Have social support (humorous friends)			X												X	
Non-western methods	X	X		X	X	X	X	X	X		X	X	X	X	X	X
Acupuncture											X					
Bloodletting						X										
Celery					X				X							
Chinese herbs					X				X							
Chrysanthemum												X				
Cilantro									X							
Ginseng					X		X		X						X	
Fish oil/salmon oil															X	
Fructose creatgi														X		
jiu xin dan ("save heart pill")		X														
Lemonade																X
mu yee													X			
nui bang													X			
Pumpkin									X							
shan di					X											
rau dap ca (chameleon leaf)												X				X

Prevention	Heart Disease				Stroke				High Blood Pressure				High Cholesterol			
	C	M	K	V	C	M	K	V	C	M	K	V	C	M	K	V
rau hung que (Asian basil)												X				
Snake extract	X															
Soups with herbs					X				X							
Steam baths								X								
Tangerine skin														X		
Tai chi						X										
tan o (edible garland)												X				
Tea		X										X		X		
tia to (purple perilla)				X												
Tumeric				X												
Zinc nitrate		X														