The Prevalence of Medical Conditions Among U.S. Chinese Community-Dwelling Older Adults

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Background. The burden of medical conditions is increasing among U.S. older adults, yet we have very limited knowledge about medical conditions among Chinese older adults in the United States. This study aimed to examine the prevalence of medical conditions and its sociodemographic and health-related correlates within the context of a population-based cohort study of U.S. Chinese older adults.

Method. Using a community-based participatory research approach, community-dwelling Chinese older adults aged 60 years and older in the Greater Chicago area were interviewed between 2011 and 2013.

Results. Of the 3,159 participants interviewed, 58.9% were female and the mean age was 72.8 years. In total, 84.3% of older adults had one or more medical condition, 24.6% reported two conditions, 19.5% had three conditions, and 17.0% reported four or more conditions. A sizeable percentage of older adults had never been screened for dyslipidemia (24.4%) or had never been screened for diabetes mellitus (35.7%).For those who reported high cholesterol, 73.0% were taking medications when compared with 76.1% of those who reported having diabetes and 88.3% of those who reported having high blood pressure. Various sociodemographic and health-related characteristics were correlated with medical conditions.

Conclusion. Medical conditions were common among U.S. Chinese older adults, yet screening and treatment rates were fairly low. Future longitudinal studies should be conducted to better understand the risk and protective factors associated with medical conditions.

Key Words: Medical conditions—Chinese—Older adults—Screening—Chronic conditions.

Received May 28, 2014; Accepted July 27, 2014

Decision Editor: Stephen Kritchevsky, PhD

AS life expectancy has increased, medical conditions have become increasingly prevalent. In the United States, approximately one in four adults has two or more medical conditions (1). Between 2010 and 2030, the prevalence of hypertension, coronary heart disease, heart failure, and stroke among U.S. adults is projected to increase by 9.9%, 16.6%, 25.0%, and 24.9%, respectively. These medical conditions may result in additional adverse health outcomes, such as increased risk for physical disability, social isolation, depressive symptoms, suicidal ideation, and mortality (2,3). The growing crisis of medical conditions has also resulted in an enormous social and economic burden. The medical cost of chronic conditions makes up 84% of annual U.S. health care spending (4). Preventing medical conditions is a priority for research and public health practice.

Older adults are disproportionally affected by medical conditions, with 91% of older adults having one medical condition and 73% having at least two medical conditions (5). Chronic medical conditions, including heart disease, cancer, and stroke, are leading causes of death among U.S. adults aged 65 years and older (6). Other medical conditions, such as high cholesterol, thyroid disease, and osteoarthritis, although not directly linked with death, may cause functional limitations and threaten older adults' quality of life across a variety of dimensions. In 2012, the Institute of Medicine proposed a "*living well with chronic conditions*" conceptual framework to confront the increasing challenge of chronic illness; the framework emphasizes that population approaches to living well with chronic disease should account for social determinants of health and differences between older and younger persons (7). Despite the public health significance, older adults have often been under-represented in epidemiological studies of medical conditions. In particular, there has been a dearth of research on medical conditions among minority older adults.

The occurrence and management of medical conditions are affected by environmental, social, economic, and cultural factors. In Chinese culture, health beliefs are substantially influenced by *Yin* and *Yang* philosophy,

which emphasizes the balance of the internal body and the external environment. Traditional Chinese medicine such as herbal medicines and acupuncture therapy are based on the *Yin* and *Yang* theory and are commonly adopted as treatments for medical conditions. Although Chinese older adults highly adhere to traditional cultural beliefs, immigration may introduce changes that may affect the onset, severity, and care of medical conditions. Existing evidence consistently suggests that the majority of Chinese American older adults have low socioeconomic status and experience substantial language and cultural barriers as well as disparities in access to healthcare, all of which may increase older adults' vulnerabilities to medical conditions (8, 9). The 2010 census counted 4 million Chinese people in the U.S., a growth of 55% over the last decade (10). Yet we know very little about the medical conditions burdening U.S. Chinese older adults. A number of prior studies are based on data from the Centers for Medicare and Medicaid Services. However, for immigrants, Medicare and Medicaid enrollment depends on citizenship status and length of stay in the United States. As a result, noncitizens or recent immigrants are often ineligible for insurance coverage (11). Studies based solely on insurance records may therefore underestimate the prevalence of medical conditions among U.S. Chinese older adults (12). There is a need for population-based studies that estimate the prevalence of medical conditions among this population so as to inform the allocation of medical resources and development of effective prevention strategies.

In this study of U.S. community-dwelling Chinese older adults in the Greater Chicago area, we aimed to (i) explore the prevalence of heart disease, stroke, cancer, high cholesterol, hypertension, diabetes, thyroid disease, osteoarthritis, and problems with joints; and (ii) examine the correlates of medical conditions among U.S. Chinese older adults.

METHODS

The Population Study of Chinese Elderly in Chicago (PINE) is a population-based epidemiological study of U.S. Chinese adults aged 60 years and older in the Greater Chicago area. The project was initiated by a synergistic community-academic collaboration among the Rush Institute for Healthy Aging, Northwestern University, and many Greater Chicago area community-based social service agencies and organizations.

To ensure the study's relevance to the well-being of the Chinese community and increase community participation, the PINE study was guided by a community-based participatory research approach. Over 20 social services agencies, community centers, health advocacy agencies, faith-based organizations, senior apartments, and social clubs served as the basis of study recruitment sites. Community-dwelling older adults aged 60 years and older who self-identified as Chinese were eligible to participate in the study. Out

of 3,542 eligible older adults approached, 3,159 agreed to participate in the study, yielding a response rate of 91.9 %. Details of the PINE study design are published elsewhere (13).

Based on available data drawn from the U.S. Census 2010 and a random block census project conducted among the Chinese community in Chicago, the PINE study is representative of the Chinese aging population in the Greater Chicago area (14). The study was approved by the Institutional Review Board of the Rush University Medical Center.

Measurements

Basic demographic information collected included age, sex, education, personal income, marital status, number of children, living arrangement, number of years in the community, and number of years in the United States. Overall health status was measured by the question, "In general, how would you rate your health?" on a four-point scale (1 = poor, 2 = fair, 3 = good, 4 = very good). Quality of life was assessed by asking, "In general, how would you rate your quality of life?" on a four-point scale ranging from 1= poor to 4 = very good. Health changes over the last year was measured by asking participants, "Compared to one year ago, how would you rate your health now?" on a three-point scale (1= worsened; 2 = same; 3 = improved).

Medical conditions.—We assessed medical conditions by asking participants whether they had ever been told by a doctor, nurse or therapist that they had the following conditions: (i) heart disease, a heart attack, coronary thrombosis, coronary occlusion, or myocardial infarction; (ii) stroke or brain hemorrhage; (iii) cancer, malignancy or tumor of any type; (iv) high cholesterol; (v) diabetes, sugar in the urine, or high blood sugar; (vi) high blood pressure; (vii) a broken or fractured hip; (viii) thyroid disease; and (ix) osteoarthritis, inflammation, or problems with joints. We defined the participant as having a medical condition if they reported "yes" to any one of the conditions queried. For those who reported any medication, we followed-up with questions about medication and medical treatment status. In addition, the screening status of dyslipidemia and diabetes mellitus was assessed by asking, "Has a doctor, nurse, or therapist checked your blood to see if you have high cholesterol?" and " Has a doctor, nurse or therapist checked your blood to see if you have diabetes, sugar in the urine, or high blood sugar?"

Data Analysis

Descriptive univariate statistics were used to summarize the prevalence of medical conditions among participants. *T*-tests, chi-square tests and Wilcoxon rank sums tests were used to analyze each medical condition and dyslipidemia

and diabetes mellitus screening status by sociodemographic characteristics. Pearson correlation coefficients and Spearman's rank correlations were calculated to determine relationships between medical conditions and sociodemographic and health-related variables. All statistical analyses were undertaken using SAS, Version 9.2 (SAS Institute Inc., Cary, NC).

RESULTS

Of the 3,159 participants interviewed, the mean age was 72.8 years ($SD = 8.3$, range = 60–105) and 58.9% were female. Overall, 84.3% of older adults had one or more medical conditions, 24.6% reported two conditions, 19.5% had three conditions, and 17.0% reported four or more conditions. Of the nine medical conditions assessed, high blood pressure was most commonly reported (55.2%), followed by high cholesterol (48.4%), osteoarthritis, inflammation, or problems with joints (39.1%), diabetes (22.3%), heart disease (15.1%), thyroid disease (8.5%), a broken or fractured hip (7.2%), stroke (5.7%), and cancer (5.3%) (Table 1). Nearly one in four older adults (24.4%) have never been screened for dyslipidemia and 35.7% have never been screened for dyslipidemia. For those who reported high cholesterol, 73.0% were taking medications when compared with 76.1% of those who reported having diabetes and 88.3% of those who reported having high blood pressure.

Significant differences were observed between older adults with and without medical conditions with respect to age, income, education, marital status, living arrangement, number of children, years in the United States, years in the community, health status, and health changes in the past year. Sociodemographic and health profiles of older adults by medical condition are presented in Table 2.

Table 3 shows the sociodemographic and health-related characteristics by screening for diabetes mellitus. Compared with those who have never been screened for dyslipidemia, those who have been screened for dyslipidemia were more likely to be female, have been in the United States for more years, have been in the community for more years, have lower health status, and have had worsening health over the past year. In addition, compared with those who have not been screened for diabetes mellitus, older adults who have been screened for diabetes mellitus were more likely to have been in the United States for more years, have lower health status, have better quality of life, and have worsening health over the past year.

Older age was significantly correlated with greater risk for cardiovascular disease, stroke, diabetes, high blood pressure, hip fracture, and problems with joints. Being male was correlated with stroke, whereas being female was correlated with high cholesterol, high blood pressure, hip fracture, thyroid disease, and problems with joints. Higher education was correlated with cardiovascular disease, cancer, hip

Table 1. Prevalence of Medical Conditions Among Study Participants

	Yes, N (%)	No, N (%)
Heart disease	478 (15.1)	2,681 (84.9)
Had a stent in the heart vessels	63 (12.9)	
Had a cardiac bypass surgery	67 (13.7)	
Stroke	181 (5.7)	2,977(94.3)
Had left over troubles from stroke	93 (51.4)	
Cancer	166 (5.3)	2,990(94.7)
Breast cancer	36 (21.2)	
Lymphoma cancer	5 (3.0)	
Prostate cancer	16 (9.4)	
Cervical cancer	13 (7.6)	
Colon cancer	21 (12.7)	
Stomach cancer	7 (4.2)	
Brain cancer	6 (3.5)	
Bladder cancer	5 (2.9)	
Lung cancer	5 (2.9)	
Esophageal cancer	4 (2.4)	
Uterine cancer	14 (8.4)	
Bone cancer	2 (1.2)	
Kidney cancer	2 (1.2)	
Oral cancer	1 (0.6)	
Liver cancer	1 (0.6)	
Ovarian cancer	1 (0.6)	
Skin cancer	1 (0.6)	
Others	38 (22.4)	
Had surgery, chemotherapy, radiation	140 (83.3)	
Had been screened for dyslipidemia	2,379 (75.6)	769 (24.4)
High cholesterol	1,524 (48.4)	1,622 (51.6)
Had been advised by physicians to take medications	1,230 (80.0)	
Currently on medications	1,120 (73.0)	
Had been screened for diabetes mellitus	2,026 (64.3)	1,133 (35.7)
Diabetes	703 (22.3)	2,451 (77.7)
Had been advised by physicians to take medications	566 (79.3)	
Currently on medications	543 (76.1)	
High blood pressure	1,741 (55.2)	1,414 (44.8)
Had been advised by physicians to take medications	1,601 (91.2)	
Currently on medications	1,544 (88.3)	
Broken or fractured hip	225 (7.2)	2,932 (92.9)
Had been advised by physicians to undertake surgery	96 (40.2)	
Had surgery	82 (39.8)	
Thyroid disease	269 (8.5)	2,887(91.5)
Had been advised by physicians to take medications	186 (67.9)	
Currently on medications	119 (43.8)	
Osteoarthritis, inflammation, or problems with joints	1,232 (39.1)	1,924 (61.0)
Had been advised by physicians to take medications	743 (59.3)	
Currently on medications	641 (86.3)	
Prescription non-narcotic medicine	468 (73.0)	
Over the counter (none-prescription) pain medicine	117 (18.3)	
Injections	25 (0.4)	
Narcotic medicine	4 (0.1)	
Others	102 (15.9)	

fracture, and thyroid disease, whereas lower education was correlated with high blood pressure. Quality of life was not significantly correlated with any of the chronic conditions

Table 2. Characteristics of Study Population by Any Medical Condition

	Heart Disease			Stroke			Cancer		
	Yes	No	p	Yes	No	p	Yes	No	p
Age	74.8 (7.5)	72.5 (8.4)	<.001	75.3 (8.0)	72.7 (8.3)	<.001	72.9 (8.6)	72.8 (8.3)	.86
Sex									
Male	228 (47.7)	1,099 (41.0)		96 (53.0)	1231 (41.4)		58 (34.9)	1,267 (42.4)	
Female	250 (52.3)	1,582 (59.0)	.01	85 (47.0)	1746 (58.7)	.00	108 (65.1)	1723(57.6)	.06
Education	10.1 (5.4)	8.5 (5.0)	<.001	8.6 (5.3)	8.7 (5.0)	.79	11.1 (5.2)	8.6 (5.0)	<.001
Income	1.8 (0.9)	2.0 (1.2)	.02	1.8 (0.8)	2.0 (1.2)	.31	1.9 (1.1)	1.9 (1.1)	.85
Marital status									
Married	331 (69.5)	1,906 (71.6)		120 (67.0)	2,116 (71.6)		113 (68.5)	2,122 (71.5)	
Separated	13 (2.7)	44 (1.7)		4 (2.2)	53 (1.8)		0 (0)	57 (1.9)	
Divorced	10 (2.1)	64 (2.4)		5 (2.8)	69 (2.3)		6 (3.6)	68 (2.3)	
Widowed	122 (25.6)	647 (24.3)	.35	50 (27.9)	719 (24.3)	.63	46 (27.9)	723 (24.3)	.15
Living arrangement	1.6 (1.8)	1.9 (1.9)	.00	1.6 (1.8)	1.9 (1.9)	.04	1.6 (1.6)	1.9 (1.9)	.60
No. of children	2.8 (1.6)	2.9 (1.5)	.06	3.1 (1.6)	2.9 (1.5)	.05	2.4 (1.5)	2.9 (1.5)	<.001
Years in the United States.	19.7 (13.2)	20.1 (13.2)	.43	22.2 (13.0)	19.9 (13.2)	.01	22.4 (16.0)	19.9 (13.0)	.19
Years in the community	10.8 (10.5)	12.4 (11.1)	.00	12.5 (11.8)	12.1 (11.0)	.94	13.2 (13.7)	12.1 (10.9)	.91
Health status	1.9 (0.8)	2.3 (0.8)	<.001	1.8 (0.8)	2.3 (0.8)	<.001	1.9 (0.8)	2.3 (0.8)	<.001
Quality of life	2.5 (0.7)	2.5 (0.7)	1.0	2.4 (0.7)	2.6 (0.7)	.02	2.6 (0.7)	2.5 (0.7)	.29
Health changes	2.5 (0.9)	2.6 (0.7)	<.001	2.4 (0.9)	2.6 (0.7)	<.001	2.6 (0.9)	2.6 (0.7)	.95

	High Cholesterol			Diabetes			High Blood Pressure		
	Yes	No	p	Yes	No	p	Yes	No	p
Age	73.3 (7.8)	72.3 (8.7)	<.001	74.3 (8.0)	72.4 (8.3)	<.001	74.4 (8.1)	70.8 (8.0)	<.001
Sex									
Male	561 (36.8)	760 (46.9)		414 (58.9)	1416 (57.8)		691 (39.7)	634 (44.8)	
Female	862 (53.1)	963 (63.2)	<.001	289 (41.1)	1035 (42.2)	.60	1,050 (60.3)	780 (55.2)	.00
Education	8.7 (5.1)	8.8 (5.0)	.45	8.8 (5.2)	8.7 (5.0)	.81	8.5 (5.1)	9.0 (4.9)	.01
Income	2.0 (1.2)	1.9 (1.1)	.03	2.0 (1.2)	1.9 (1.1)	.01	2.0 (1.1)	1.9 (1.2)	.04
Marital status									
Married	1037 (68.4)	1,191 (74.1)		465 (66.3)	1,769 (72.8)		1,163 (67.2)	1,072 (76.4)	
Separated	31 (2.0)	26 (1.6)		19 (2.7)	38 (1.6)		31 (1.8)	26 (1.9)	
Divorced	39 (2.6)	34 (2.1)		19 (2.7)	54 (2.2)		31 (1.8)	42 (3.0)	
Widowed	409 (27.0)	357 (22.2)	.01	198 (28.3)	570 (23.5)	.01	505 (29.2)	263 (18.8)	<.001
Living arrangement	1.8 (1.8)	2.0 (1.9)	<.001	1.7 (1.9)	1.9 (1.9)	<.001	1.7 (1.8)	2.0 (2.0)	<.001
No. of children	3.0 (1.5)	2.8 (1.5)	.00	3.1 (1.6)	2.8 (1.5)	<.001	3.0 (1.6)	2.7 (1.4)	<.001
Years in the United States	22.2 (13.5)	18.0 (12.6)	<.001	22.7 (13.8)	19.2 (12.9)	<.001	21.8 (13.3)	17.8 (12.7)	<.001
Years in the community	13.3 (11.6)	11.0 (10.4)	<.001	13.3 (12.0)	11.8 (10.7)	.003	13.2 (11.8)	10.8 (9.9)	<.001
Health status	2.1 (0.8)	2.4 (0.8)	<.001	2.0 (0.8)	2.3 (0.8)	<.001	2.1 (0.8)	2.4 (0.8)	<.001
Quality of life	2.5 (0.7)	2.6 (0.7)	.02	2.5 (0.7)	2.5 (0.7)	.40	2.5 (0.7)	2.5 (0.7)	.98
Health changes	2.5 (0.8)	2.7 (0.7)	<.001	2.5 (0.8)	2.6 (0.7)	<.001	2.6 (0.8)	2.6 (0.7)	.00

	Broken Hip			Thyroid Disease			Osteoarthritis		
	Yes	No	p	Yes	No	p	Yes	No	p
Age	74.5 (8.4)	72.7 (8.3)	.001	73.3 (7.9)	72.8 (8.3)	.27	74.1 (8.3)	72.0 (8.2)	<.001
Sex									
Male	69 (30.7)	1258 (42.9)		396 (32.1)	931 (48.4)		67 (24.9)	1,260 (43.6)	
Female	156 (69.3)	1674 (57.1)	<.001	836 (67.9)	993 (51.6)	<.001	202 (75.1)	1,627 (56.4)	<.001
Education	9.6 (5.4)	8.7 (5.0)	.01	9.9 (5.3)	8.6 (5.0)	<.001	8.4 (5.2)	8.9 (5.0)	.00
Income	1.9 (0.8)	2.0 (1.2)	.80	2.0 (1.3)	1.9 (1.1)	.84	1.9 (1.0)	2.0 (1.2)	.05
Marital status									
Married	139 (62.1)	2,097 (72.0)		797 (64.9)	1,439 (75.5)		175 (65.8)	2,061 (71.9)	
Separated	4 (1.8)	53 (1.8)		25 (2.0)	32 (1.7)		6 (2.3)	51 (1.8)	
Divorced	7 (3.1)	67 (2.3)		28 (2.3)	46 (2.4)		11 (4.1)	63 (2.2)	
Widowed	74 (33.0)	694 (23.8)	.01	378 (30.8)	389 (20.4)	<.001	74 (27.8)	693 (24.2)	.08
Living arrangement	1.5 (1.7)	1.9 (1.9)	<.001	1.6 (1.7)	1.9 (1.9)	.02	1.6 (1.8)	2.0 (1.9)	<.001
No. of children	2.8 (1.6)	2.9 (1.5)	.50	2.7 (1.4)	2.9 (1.5)	.04	2.9 (1.5)	2.9 (1.5)	.97
Years in the United States	18.3 (10.7)	20.1 (13.3)	.21	20.7 (13.3)	20.0 (13.2)	.45	20.5 (12.2)	19.7 (13.8)	.00
Years in the community	11.0 (10.1)	12.2 (11.1)	.20	11.5 (11.2)	12.2 (11.0)	.15	12.4 (11.1)	12.0 (11.0)	.38
Health status	2.0 (0.8)	2.3 (0.8)	<.001	2.1 (0.8)	2.3 (0.8)	.00	2.0 (0.8)	2.4 (0.8)	<.001
Quality of life	2.6 (0.7)	2.5 (0.7)	.41	2.6 (0.7)	2.5 (0.7)	.27	2.5 (0.7)	2.5 (0.7)	.99
Health changes	2.5 (0.8)	2.6 (0.8)	.01	2.5 (0.8)	2.6 (0.8)	.11	2.5 (0.8)	2.7 (0.7)	<.001

Table 3. Screening for Dyslipidemia and Diabetes Mellitus in Chinese Older Adults

	Screening for Dyslipidemia			Screening for Diabetes Mellitus		
	Yes	No	p	Yes	No	p
Age	72.9 (8.1)	72.4 (8.9)	.19	72.9 (8.2)	72.6 (8.6)	.21
Sex						
Male	943 (39.6)	377 (49.0)		838 (41.4)	485 (43.1)	
Female	1,436 (60.4)	392 (51.0)	<.001	1,188 (58.6)	641 (56.9)	.35
Education	8.8 (5.1)	8.6 (5.0)	.43	8.8 (5.1)	8.6 (5.0)	.37
Income	2.0 (1.2)	1.9 (1.0)	.58	2.0 (1.2)	1.9 (1.0)	.69
Marital status						
Married	1,657 (70.1)	573 (75.1)		1,403 (69.7)	830 (74.2)	
Separated	44 (1.9)	13 (1.7)		41 (2.0)	16 (1.4)	
Divorced	61 (2.6)	12 (1.6)		56 (2.8)	17 (1.5)	
Widowed	601 (25.4)	165 (21.6)	.05	512 (25.5)	255 (22.8)	.02
Living arrangement	1.8 (1.9)	2.0 (1.9)	.08	1.9 (1.9)	1.9 (1.9)	.90
No. of children	2.9 (1.5)	2.8 (1.4)	.11	2.9 (1.5)	2.8 (1.4)	.46
Years in the United States	20.7 (13.3)	17.9 (12.6)	<.001	20.8 (13.3)	18.7 (12.8)	<.001
Years in the community	12.4 (11.2)	11.5 (10.6)	.04	12.2 (11.0)	12.0 (11.0)	.96
Health status	2.2 (0.8)	2.3 (0.8)	<.001	2.2 (0.8)	2.3 (0.8)	.00
Quality of life	2.6 (0.7)	2.5 (0.7)	.15	2.6 (0.7)	2.5 (0.6)	.01
Health changes	2.6 (0.8)	2.7 (0.8)	.02	2.6 (0.8)	2.6 (0.7)	.02

assessed. Correlates of each medical condition are presented in Table 4.

DISCUSSION

Medical conditions were prevalent among the U.S. Chinese older adults in this study, with 84.3% of older adults reporting one or more medical conditions and over half reporting two or more conditions. However, a large percentage of U.S. Chinese older adults have never been screened for dyslipidemia and diabetes mellitus or were not taking medications for their chronic conditions. Various sociodemographic and health-related characteristics were correlated with medical conditions.

Our knowledge of the health status of U.S. Chinese older adults is often impeded by a lack of research in this population. As the largest epidemiological study of community-dwelling Chinese older adults in the United States, the PINE study provides importance empirical evidence for the magnitude of medical conditions among U.S. Chinese older adults. This study also examined the sociodemographic and health-related characteristics associated with medical conditions, which may help us identify those at risk for medical conditions and provide implications for effective prevention and intervention strategies.

Our study shows that medical conditions were common among U.S. Chinese older adults. Similar to other racial/ethnic groups, Chinese older adults reported a higher prevalence of high blood pressure (55.2%), high cholesterol (48.4%), and diabetes (22.3%) when compard with other conditions. In addition to these common medical conditions,

U.S. Chinese older adults were also at risk for cardiovascular disease (15.1%), stroke (5.7%), and cancer (5.3%), all of which are significantly associated with mortality. The prevalence of medical conditions among this population of U.S. Chinese older adults is comparable to the national estimate, which reports a prevalence of 21.8% for diabetes among older adults aged 65–74 years, 20.0% for diabetes among those aged 75 years and older (15), and 66.7% for high blood pressure among adults aged 60 years and older (16). Despite methodological differences, the prevalence of medical conditions found in our study is similar with that of the 2007 California Health Interview Survey, which found that the prevalence of high blood pressure and heart disease among Chinese adults aged 60 years and older was 53.6% and 15.9%, respectively (17). However, the prevalence of diabetes in our population is higher than that of the California study (15.9%).

Compared with studies conducted among Chinese older adults outside the United States, the prevalence of medical conditions was also higher in this study. In a recent study of 13,157 adults aged 50 years and older in mainland China using self-reported measures, 3% had a stroke, 7% reported diabetes, 27% had hypertension, and 22% had arthritis (18), all of which were lower than that reported among our study sample. In a nationally representative study based on data collected at clinical biochemical laboratories in mainland China, 20.4% of adults aged 60 years and older had diabetes, which was also lower than the prevalence of diabetes found in our population (19). In Hong Kong, census data reported that about 70.4% of older adults had chronic diseases, of which 62.5% suffered from hypertension, 21.7% had diabetes, and 16.3% had high cholesterol (20). Compared with older adults in mainland China, Hong Kong, or other regions, U.S. Chinese older adults may suffer from acculturation stress and encounter discrimination, which may lead to a higher risk for medical conditions (21,22). In addition, Chinese older adults in the United States may be experiencing greater risk for medical conditions following exposure to unhealthy aspects of western lifestyles, such as consumption of high sugar beverages and high-fat dairy products.

Although medical conditions were common among our participants, findings revealed that a fair proportion of older adults have never been screened for dyslipidemia and diabetes mellitus. Our findings may echo the findings of the California Health Survey suggesting that Asian Americans were significantly less likely than whites to test glucose regularly (23). Language and cultural barriers may be important contributors for the low screening rate in our population. In addition, this study suggests that older adults who have never been screened for dyslipidemia and diabetes mellitus have been in the United States for fewer years than those who have undergone these screenings. This finding in part may be explained by differences in acculturation levels among older adults. Those who have been in the

Table 4. Correlations Between Medical Conditions and Sociodemographic and Health-Related Characteristics

	Age	Sex	Edu	Income	MS	Living	Children	US	Com	OHS	QOL	HC	CAD	Stroke	CA	Chol	DM	HTN	Hip	Thy	OA
Age	1.00																				
Sex	0.01	1.00																			
Edu	−0.18*	−0.21#	1.00																		
Income	−0.04	0.00	0.11#	1.00																	
MS	−0.44#	−0.32#	0.20*	−0.03	1.00																
Living	−0.32#	−0.07#	−0.03	−0.10#	0.26#	1.00															
Child	0.32#	0.09#	−0.40#	−0.07**	−0.14#	−0.03	1.00														
Yrs in U.S.	0.38#	0.03	−0.09#	0.30#	−0.24#	−0.29#	0.13#	1.00													
Yrs in Com	0.26#	0.02	−0.09#	0.19	−0.16#	−0.20#	0.08#	0.67#	1.00												
OHS	−0.08+	−0.06+	0.05***	0.10	0.04	−0.03	0.00	0.04	0.09#	1.00											
QOL	0.03	0.05+	0.10#	0.06+	−0.02	0.00	0.04	0.02	−0.01	0.31#	1.00										
HC	−0.13#	−0.03	0.03	0.05*	0.07+	0.00	−0.03	−0.02	0.06+	0.33#	0.14#	1.00									
CAD	0.09#	−0.03	0.10#	−0.06+	−0.01	−0.04*	−0.03	−0.02	−0.05+	−0.16#	0.01	−0.08#	1.00								
Stroke	0.07#	−0.06#	0.01	−0.04*	−0.02	−0.03	0.03	0.02	0.00	−0.13#	−0.03	−0.08#	0.14#	1.00							
Cancer	0.00	0.02	0.10#	−0.00	−0.02	−0.03	−0.06#	0.04*	0.02	−0.08#	0.02	0.00	0.01	0.02	1.00						
Chol	0.03	0.10#	0.01	0.03	−0.04*	−0.04*	0.03	0.13#	0.09#	−0.13#	−0.02	−0.07#	0.10#	0.05+	0.01	1.00					
DM	0.08#	0.03	0.03	0.03	−0.04*	−0.04*	0.05+	0.09#	0.04*	−0.15#	0.00	−0.08#	0.12#	0.10#	0.03	0.21#	1.00				
HTN	0.20#	0.05+	−0.04*	0.00	−0.09#	−0.07#	0.08#	0.13#	0.09#	−0.14#	−0.00	−0.06+	0.12#	0.10#	0.01	0.23#	0.16#	1.00			
Hip	0.06#	0.06#	0.05+	−0.02	−0.06+	−0.06+	−0.01	−0.04+	−0.03	−0.07+	−0.05+	0.05#	−0.00	0.02	0.00	0.04*	0.00	0.00	1.00		
Thy	0.02	0.10#	0.07#	0.00	−0.04*	−0.04*	−0.04	0.01	−0.02	−0.05+	0.02	−0.03	0.05+	0.00	0.04*	0.06#	0.03	0.07#	0.04*	1.00	
OA	0.09#	0.14#	−0.03	−0.00	−0.09#	−0.08#	−0.01	0.02	0.00	−0.16#	0.03	−0.11#	0.08#	0.02	0.05+	0.11#	0.04*	0.09#	0.08#	0.03	1.00

Notes: Edu = education; Children = number of children; MS = marital status; Living = living arrangement; Yrs =Years; OHS = overall health status; QOL = quality of life; HC = health changes over last year; CAD = cardiovascular disease; Chol = high cholesterol; HTN = hypertension; Hip = a broken hip; OA = osteoarthritis; DM = diabetes mellitus; CA = cancer.
*$p < .05$, +$p < .01$, #$p < .001$.

United States for more years may possess better language proficiency and thus may be more aware about available health care services and resources.

The medication and treatment status of our population also warrants attention. Chronic medical conditions tend to be progressive, getting worse over time without appropriate treatments. Our study found that among those who had medical conditions, a sizeable number of older adults were not taking the medications suggested by their physicians to control their conditions. Delays in seeking treatment for chronic medical conditions have been frequently observed among Asian American older adults. Lack of insurance coverage, difficulties communicating with healthcare providers, and unfamiliarity with the U.S. healthcare system may prevent many Chinese older adults from seeking timely treatment. Traditional cultural beliefs may also play a part. In a qualitative study of Chinese immigrants with arthritis, participants believed that Western medicine only dealt with the symptoms, whereas Chinese medicines focused more on the root of the disease and thus are more effective in managing chronic conditions (24). In addition, influenced by their belief of "all things in moderation," some Chinese older adults may think that Western medicines are too strong, making them hesitant to see a western physician and less likely to comply with prescribed medication (24).

Contrary to the notion that higher educational attainment predicts better health (25), our study found that the risk of cardiovascular disease, cancer, hip fracture, and thyroid disease increased as education level increased. Lower education levels were associated with greater risk

for high blood pressure only. Although more highly educated adults may be more likely to maintain a healthy lifestyle leading to lower risk for medical conditions, this may not be true among Chinese populations. A study examining the association between education and healthfulness of lifestyle yielded contrary findings between Chinese adults and U.S. adults. Among Chinese adults, the likelihood of having a healthier lifestyle decreased as the level of education increased, but the opposite trend was found among the U.S. adults (26). The effects of immigration may mitigate the health benefits of higher education level. That is, higher educated older adults may experience similar acculturation barriers as lower educated adults. Moreover, prior studies conducted among the same cohort as the current study found that higher educated older adults were actually at greater risk for stressful life events, such as elder abuse and discrimination (27). These stressful life events may lead to increased risk for development of medical conditions. However, it is also possible that lower educated older adults were less likely to seek health care services and thus were less aware of their medical conditions, resulting in a lower prevalence of self-reported medical conditions. The pathway through which socioeconomic status affects medical conditions necessitates further exploration.

Another interesting finding is that quality of life was not significantly correlated with medical conditions of any kind. The presence of medical conditions is often linked to lower quality of life—especially health-related quality of life (28). As family support is a great component of caring for Chinese older adults, we suspect that those with medical conditions received high levels of family support and may

thus perceive similar quality of life as those without any of the medical conditions assessed. Although it is impossible to draw a distinctive conclusion, our finding may raise concerns about using quality of life as a treatment outcome for medical conditions.

Our study findings should be interpreted with limitations in mind. First, although we examined a representative sample of Chinese older adults in the Greater Chicago area, the findings may not be generalizable to Chinese older adults in other geographic areas. Second, our study depends on self-report of medical conditions but not clinical diagnosis, which may result in underestimates of the prevalence of medical conditions. Third, we did not have the information of the length of time since last diagnosis. It is likely that some participants have been diagnosed with medical conditions before immigrating to the United States. Future studies may need to distinguish the screening and diagnosis rate before and after immigration. In addition, this study utilized a cross-sectional design and we were not able to postulate on potential temporal relationships. Future longitudinal studies should be conducted to improve our understanding of the risk and protective factors for medical conditions among U.S. Chinese older adults.

This study has important research, policy, and intervention implications. The study suggests that medical conditions were prevalent among Chinese older adults. Increased research effort should be devoted to understanding the risk and protective factors of medical conditions. In addition, community organizations should continue to promote health and wellness education and programs, such as health screenings, senior fitness programs, and education and nutrition workshops to help Chinese older adults maintain healthy lifestyles. Healthcare practitioners who serve Chinese older adults should improve their understanding of cultural self-care approaches and tailor care to the specific needs of Chinese older adults.

Conclusion

This study found that medical conditions were common among the U.S. Chinese older adults, but a substantial proportion of older adults have never been screened for dyslipidemia and diabetes mellitus or were not taking medication for their medical condition. Medical conditions varied by sociodemographic and health-related characteristics. Future longitudinal studies are needed to improve our understanding of the risk and protective factors of medical conditions among the U.S. Chinese older adults.

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