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Comparing Selected Measures of Health Outcomes and Health-Seeking Behaviors in Chinese, Cambodian, and Vietnamese Communities of Chicago: Results from Local Health Surveys

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ABSTRACT *We describe how local community organizations partnered to conduct a survey in the Chinese, Cambodian, and Vietnamese populations of Chicago to compare health outcomes and assess progress toward Healthy People 2010 goals. Interviews were conducted with 380 randomly selected Chinese adults through door-to-door sampling, and with 250 Cambodian adults and 150 Vietnamese adults through respondent-driven sampling. Data on 14 key health outcomes are described for this analysis. The three surveyed communities were generally poorer, less educated, more often foreign-born, and had less English proficiency than Asians nationally. There were few significant variations among the three populations, but there were notable differences in the burden of tuberculosis, obesity, diabetes, and arthritis. Insurance coverage and cancer-screening utilization were also significantly lower than for US Asians. Health information about Chinese, Cambodian, and Vietnamese populations in Chicago are available for the first time and serve as baseline data for community interventions. Findings highlight important health concerns for these populations and have implications for funders and policy makers in allocating resources, setting health priorities, and addressing health disparities.*

KEYWORDS *Asian American, Chinese, Cambodian, Vietnamese, Health disparities*

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This paper is based on the results of the survey project conducted by the Asian Health Coalition of Illinois (AHCI) in 2006–2008 in partnership with the Sinai Urban Health Institute (SUHI), the Chinese American Service league (CASL), the Chinese Mutual Aid Association (CMAA), and the Cambodian Association of Illinois (CAI). At the time the project was performed, L. Guo, M. Magee, W. Cheung, and H. Liu were all affiliated with AHCI. Authors especially acknowledge all staff and leadership of the community partners, most notably Esther Wong, Steve Brunton, Kompha Seth, Amy Hoskins, and Benjamin Rucker, without whom this study could not have been possible.

INTRODUCTION

According to the American Community Survey 2004, there are an estimated 13.5 million Asian Americans living in the USA.[1] Asian Americans are the most diverse and fastest growing racial and ethnic group, expected to exceed 10% of the population by 2050.[2,3] Despite being a heterogeneous population with varied cultural backgrounds, socioeconomic status, and migration patterns, existing health data for Asian Americans are often aggregated and limited in scope.

The paucity of systematic data collection about specific Asian subgroups puts Asian Americans at a disadvantage in improving their health. For one, they are unable to adequately measure progress toward reaching the Healthy People 2010 (HP2010) goals. Whereas black–white disparities are mentioned in almost all of the HP2010 indicators, only 37% of the indicators have baseline estimates for Asians.[4,5] Data that are available come from national surveys or from selected states with large concentrations of Asians. These data are aggregated, and their small sample size make it difficult to analyze the health of different Asian ethnicities, such as Chinese or Cambodian Americans. In fact, aggregated data are often misleading and falsely portray Asians as the "model minority."[6,7] Furthermore, existing data come from national surveys, which are not offered in Asian-specific languages and thus exclude respondents with limited English proficiency and consequently those with lower socioeconomic status and poorer health outcomes.[8]

The lack of accurate health data further indicate the need to explore alternative approaches to obtaining such information about specific Asian subpopulations.[4] Increasingly, local-level research has captured the health concerns of diverse racial and ethnic groups.[9] In fact, some community assessments have not only measured the health of these groups but also effectively demonstrated the importance of gathering such data for local jurisdictions and using it to make legislative and programmatic improvements.[10–12] These initiatives have also revealed important variations in health status between different Asian subpopulations, which are essential to informing evidence-based and culturally appropriate community health plans.

Chicago has one of the largest concentrations of Asians in the Midwest, yet health data about this population remain rudimentary. There are more than 120,000 Asian Americans in Chicago (4% of the population), comprised of 25% Chinese, 23% Filipino, 20% Asian Indians, 10% Korean, 7% Vietnamese, 4% Japanese, and 11% Other.[13] In response to the growing need for health data, local community-based organizations partnered to identify, document, and address health concerns facing Asian communities in Chicago. In this paper, we compare and contrast the health of three Asian communities in Chicago by describing 14 health outcomes in relation to US Asian estimates and the HP2010 goals.

METHODS

Surveyed Communities

Motivated by the need for local-level data to make meaningful community plans, community-based organizations and research institutions partnered to conduct three Asian health surveys. Based on the strengths and relationships of the organizations, three Asian populations were identified to be surveyed: Chinese, Vietnamese, and Cambodian. The Chinese population was selected because it has one of the largest ethnic enclaves in Chicago, located in the Chinatown area of Armour Square.[13] The Vietnamese and Cambodian populations in Uptown and Albany Park, respectively,

were selected due to the lack of data available for those specific groups. Uptown and Albany Park were also among the top five communities with the highest proportion of Asians in Chicago and identified by local funding agencies as neighborhoods in "high need" of health data and intervention.

Survey Design

Survey instruments were designed based on existing surveys. Questions, wherever possible, were taken from published national and state health surveys (e.g., Behavioral Risk Factor Surveillance System, National Health Inventory Survey) so that appropriate comparison data would be available and progress toward HP2010 goals could be assessed. Instruments were translated, back-translated, and pilot-tested in English, Mandarin, Cantonese, Khmer, and Vietnamese. When available, questions already translated into one of these languages were adapted from existing local surveys (Personal communication with New York City Department of Health and Mental Hygiene).

Final instruments were shaped and approved by two Project Advisory Committees (PAC): one for the Chinese survey and the other for the Cambodian/Vietnamese surveys. PAC members included community leaders, residents, researchers, and other stakeholders from each study area. The committees provided input on surveys topics that were most relevant to their respective populations and offered valuable feedback to improve the wording of questions for each instrument.

Three survey instruments were designed containing similar topics and comparable questions. Table 1 outlines key health topics from the surveys. These include measures of health conditions and associated risk factors, quality of life indicators, and questions assessing access to health care and services. The final instruments included about 200 questions each. The surveys were administered face-to-face in five different languages and took about 45 min to complete. Six questions about HIV were asked through a self-administered questionnaire because of their sensitive nature. Participants confidentially responded to these questions and placed this one-page paper questionnaire into an envelope, sealed it, and returned it to the interviewer. All instruments and methodology protocols were approved by PAC and the Sinai Health

TABLE 1 Health topics on three Chicago Asian surveys

Sociodemographic characteristics	Health conditions	Health risk factors	Quality of life measures	Healthcare access
Education	Arthritis	Accident prevention	Health-related quality of life	Cancer screening
Employment	Cholesterol	Alcohol	Mental health	Health insurance coverage
Income	Diabetes	Diet/nutrition	Self-rated health	HIV/STD testing
Level of English proficiency	Hepatitis	Obesity		Medication supplements
Sense of community[a]	Hypertension	Physical activity		Usual source of care
	Tuberculosis	Smoking		Vaccinations
	Other disease outcomes			

[a] Topics in Cambodian and Vietnamese surveys only

System Institutional Review Board. All participants signed and received copies of the informed consent. Details on methods are documented elsewhere.[14,15]

Chinese Data Collection

A three-stage population-based sampling plan was developed in collaboration with the Survey Research Laboratory of the University of Illinois at Chicago to identify a representative sample of Asians living in Armour Square (which comprises Chicago's Chinatown). Four of the six Census tracts in this area were first selected based on the highest proportion of Asian households (>50%). From the four combined tracts, 30 blocks were randomly selected. All households from these blocks were listed from Genesys Survey Sampling, excluding nonresidential addresses. When household residences were not listed on this original block-list, they were added. Interviewers screened all households employing the Trodahl–Carter Bryant selection matrix to randomly select an eligible adult to participate in the study. If the selected adult was not available, interviewers returned to the home up to seven times to complete the survey before the household was considered a refusal.

Adults 18 years or older who self-identified as Asian and lived in the community for at least 6 months were eligible to participate in the survey. Respondents received $20 for their time and had to consent to participate. Surveys were conducted at participants' residences in English, Mandarin, and Cantonese by bilingual or trilingual interviewers. Interviewers received nearly 15–20 hours of training before going to the field. The vast majority (96%) of interviews were conducted in one of the Chinese languages.

Eight interviewers administered the Chinese survey in two phases because of funding constraints: Phase 1 was from November 2006 to January 2007 and Phase 2 from June 2007 to March 2008. Interviewers visited 904 households, of which 570 (63.1%) were eligible (e.g., current residencies and self-identified as Asian). They subsequently made contact with 447 household members, of whom 385 (86.1%) agreed to complete the survey. The overall response rate, defined as the number of completed interviews divided by the total eligible sample approached, was 67.2%. In the end, 380 surveys from 19 completed blocks were available for these analyses.

Cambodian and Vietnamese Data Collection

Asians living outside of Armour Square's Chinatown were far more dispersed. To maximize resources and maintain scientific rigor, investigators worked with the Cambodian and Vietnamese community partners and adapted a relatively new technique, respondent-driven sampling (RDS),[16–18] to obtain a representative sample of the Vietnamese and Cambodian populations in Uptown and Albany Park, respectively.

Two seeds (i.e., or starting participants for recruitment) were identified from the phone book using common surnames for the Cambodian population and four seeds for the Vietnamese population. Each seed completed the survey and was given three coupons to recruit additional participants. Adults over 18 years, who self-identified as Vietnamese or Cambodian; spoke English, Khmer, Vietnamese, or Cantonese; had proof of residency in Albany Park or Uptown based on zip code; and presented with a valid study coupon from a referring participant were eligible to participate in the study.

Each participant was asked to estimate their social network size, defined as the number of people who they knew in the community, and to describe their relationship to the referring participant (e.g., friend, relative, acquaintance).

Respondents received $20 for their time and were mailed $5 for each referred participant. Data were collected by staff at the two community partners in Albany Park and Uptown. Staff received close to 10 hours of training on study procedures. The number of waves (i.e., rounds of recruitment) needed to reach the target sample size depends on the social network size of each respondent, starting with the seeds. It took 13 waves to complete 150 surveys in the Cambodian population over 12 weeks, and 35 waves to recruit 250 surveys in the Vietnamese population over 21 weeks. Both samples reached enough waves to ensure a random sample as defined in previous reports.[16]

Data Analyses

The Chinese survey data were weighted to the probability of selection (at the block and respondent levels) and were age-adjusted to the 2000 US standard population. Data were analyzed using PROCSURVEY FREQ in SAS version 9.0 to account for the complex survey (SAS Institute Inc., Cary, NC).

Data from the Cambodian and Vietnamese surveys were analyzed using RDS Analyses Tool version 5.6.[19] Survey data were weighted to respondents' social network size to obtain a population-based representative sample within each specified geographic area.

Ninety-five percent confidence intervals were estimated for all analyses. Differences among the three populations surveyed and between each population and US Asian estimates were compared using *t* tests with normal approximation and then utilizing the resulting *z* statistic to obtain the *p* value. A *p* value of 0.05 was employed here to denote a statistically significant difference. Additional analyses of health outcomes were examined by age, gender, years in the USA, and language proficiency. Such exploratory analyses were conducted in SPSS version 14.0. Results for these analyses from the Vietnamese and Cambodian surveys are not weighted.

RESULTS

Table 2 describes the survey questions that correspond to the 14 health measures presented for this analysis, including four questions on health conditions, two on associated risk factors, two on quality of life, and six on access to health care and services.

Table 3 presents the final sample demographics for survey respondents from the Chinese, Cambodian, and Vietnamese surveyed populations in Chicago compared to data for Asians nationally from the American Community Survey.[20] Among all three Asian populations, there were slightly more female than male respondents. Chinese respondents were generally older and Cambodian respondents were generally younger, trends that are consistent with the age distribution for these Asian subpopulations nationally (data not shown). About half were high school graduates, compared to 85% for Asians in the USA. Most of the three populations reported the annual household income from all sources as <$30,000, with 81% of the Vietnamese sample falling into this category. The vast majority were foreign born, including 100% of the Vietnamese sample. Among those who were foreign born, a little more than half lived in the USA for more than 10 years. Finally, Vietnamese and Chinese respondents reported having lower English proficiency than Cambodian respondents, but the majority of all three samples reported that their spoken English proficiency was less than "very well." In comparison to the US Asian population, all three Asian

TABLE 2 Description of 14 selected health measures

Health measure	Description
Health conditions	
Arthritis	The proportion of adults who reported yes to the question, "Have you ever been told by a doctor or other health professional that you have some form of arthritis?"
Diabetes	The proportion of adults who reported yes to the question, "Have you ever been told by a health care provider that you have diabetes?"
High blood pressure	The proportion of adults who reported yes to the question, "Have you ever been told by a doctor, nurse, or other health professional that you have high blood pressure or hypertension?" Those who responded yes and borderline were included in the numerator.
Tuberculosis (TB)	The proportion of adults who responded yes to the question, "Have you ever been diagnosed with tuberculosis?"
Health risk factors	
Current smoker	The proportion of adults who responded yes to both "Have you ever smoked at least 100 cigarettes in your entire lifetime?" and "Do you smoke cigarettes now?"
Obesity	Body mass index (kg/m^2) was calculated based on self-reported height and weight. Those with a BMI greater than 30 kg/m^2 were classified as being obese.
Quality of life measures	
Activity limitations from arthritis	The proportion of all adults who reported yes to the question, "Are you now limited in any of your usual activities because of arthritis or joint symptoms?"
Self-rated health	The proportion of adults who reported fair/poor health in response to the question, "In general, would you rate you health as excellent, very good, good, fair, or poor?"
Access to healthcare	
Currently insured	The proportion of adults 18–64 years old who responded yes to the question, "Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?"
Mammogram in the last 2 years	The proportion of women 40 years or older who responded yes to the question, "Have you ever had a mammogram or breast x-ray," and reported either within the last 12 months or the last 2 years to the question, "How long ago was your most recent mammogram?"
Pap test in the last 3 years	The proportion of women 18 years or older who responded yes to the question, "Have you ever had a Pap test?," and reported either within the past year, past 2 years, or past 3 years to the question, "How long ago did you have your most recent Pap test?"
Ever had colonoscopy	The proportion of adults 50 years or older who reported yes to the question, "Sigmoidoscopy and colonoscopy are internal examinations of the colon often used to screen or diagnose cancer. Have you ever had either of these exams?"
Ever tested for HIV	The proportion of adults who reported yes to the question, "Have you ever been tested for HIV?" The HIV section was self-administered on a separate sheet of paper.
Ever tested for TB	The proportion of adults who responded yes to the question, "Have you had either a PPD test or a chest X-ray to screen for tuberculosis or TB?"

TABLE 3 Sociodemographic characteristics of the Chinese, Cambodian, and Vietnamese populations surveyed in Chicago compared to US Asians

	Chinese	Cambodian	Vietnamese	US Asians [a]
Gender				
Female (%)	55.8	64.0	58.6	51.7
Age				
18–44 years (%)	28.5	48.7	28.9	57.7
45–64 years (%)	34.3	32.8	45.5	30.5
65+ years (%)	37.2	16.7	25.6	11.7
Education[b]				
High school or more (%)	45.8	45.2	49.3	85.4
Annual household income				
Less than $30,000 (%)	68.9	59.9	80.7	–
Employment				
Unemployed (%)	18.0	37.8	59.1	3.4
Nativity				
Foreign born (%)	93.4	80.2	100.0	67.2
Among foreign born, years in the US				
10+ years (%)	58.2	55.8	62.7	75.4
Spoken English proficiency[c]				
Less than "very well" (%)	90.3	81.7	97.3	36.1

[a] Data Source: 2005–2007 American Community Survey (ACS) 3-Year Estimates for Asians alone
[b] In ACS, education level was asked among those 25 years and older
[c] In ACS, spoken English Proficiency was asked among those who speak a language other than English

subpopulations were poorer, had fewer years of education, were more likely to be foreign born, and reported lower English proficiency.

Table 4 presents the 14 descriptive indicators about the Chinese, Cambodian, and Vietnamese populations in Chicago compared to US Asian estimates and the HP2010 Target, when available.

Health Conditions

The survey included questions to determine the prevalence of numerous health outcomes. Four health conditions were selected for this analysis: ever diagnosed with arthritis, diabetes, high blood pressure, and tuberculosis (TB). The proportion of adults ever diagnosed with arthritis was twice as high among Cambodian and Vietnamese adults compared to their Chinese (12%) and US Asians (10%) counterparts. Between 7% and 13% of adults reported that they had ever been diagnosed with diabetes compared to 9% of Asians nationally. There was no significant differences in the prevalence of diabetes between the three Asian subgroups or when compared to the US Asian estimate. Women were more likely to be diagnosed with diabetes than men among Vietnamese adults ($p<0.05$), with no significant differences by gender in the other populations. Between 22% and 28% of Chinese and Vietnamese adults, respectively, reported that they were ever diagnosed with high blood pressure. Rates of high blood pressure were similar to the US Asian estimate of 19.5% but nearly twice as high as the HP2010 target (16%). Cambodian women were significantly more likely to have ever been diagnosed with high blood pressure compared to Cambodian men. There was a significantly greater proportion of Cambodian adults who had ever been diagnosed with TB (41%) compared to only 5% to 6% of Vietnamese and Chinese populations. Within the Vietnamese

TABLE 4 **Comparing selected survey findings of Chinese, Cambodian and Vietnamese populations in Chicago to US Asians and Healthy People 2010 Targets**

	Chinese (Armour Square) % (95% CI)	Cambodian (Albany Park) % (95% CI)	Vietnamese (Uptown) % (95% CI)	Survey Differences	US Asians[a] % (95% CI)	HP2010 Target[b]
Health conditions						
Ever diagnosed with arthritis	12.1 (10.4, 13.7)	24.5 (12.0, 38.0)*	21.5 (12.2, 32.4)*	B	9.9 (7.9, 11.9)[c]	–
Ever diagnosed with diabetes	7.1 (5.8, 8.5)	12.0 (3.4, 22.0)	12.9 (6.4, 22.2)	ns	8.9 (6.9, 10.9)	–
Ever diagnosed with high blood pressure	22.1 (19.1, 25.1)	25.7 (16.6, 36.7)	28.4 (18.0, 36.9)	ns	19.5 (17.0, 22.0)[d]	16%
Ever diagnosed with tuberculosis	6.2 (4.0, 8.3)	40.6 (22.5, 57.7)	4.5 (0.9, 10.4)	A,C	–	–
Health risk factors						
Current smoker	13.3 (10.8, 15.9)*	12.7 (4.5, 24.5)	7.6 (1.5, 16.1)	ns	9.2 (7.4, 11.0)	12%
Obese (body mass index ≥30 kg/m^2)	3.9 (2.2, 5.3)*	11.4 (6.6, 32.2)	1.9 (0.0, 3.7)*	A,C	8.9 (7.0, 10.8)	15%
Quality of life						
Activity limited by arthritis	11.3 (8.8, 13.7)	20.9 (8.6, 34.1)	16.8 (8.5, 26.5)	ns	–	21%
Self-rated health (% fair/poor)	36.9 (33.6, 40.2)*	46.9 (35.0, 60.8)*	46.2 (29.9, 61.0)*	ns	11.0 (8.8, 13.2)	–
Access to healthcare						
Currently insured (adults 18–64 years)	52.0 (48.0, 56.0)*	53.6 (33.5, 73.8)*	64.2 (47.8, 78.8)	ns	80.9 (79.5, 82.4) [e]	100%
Mammogram in past 2 years (women ≥40 years)	45.7 (38.8, 52.5)	43.0 (20.5, 65.0)	59.0 (41.7, 74.2)	ns	54.0 (47.1, 60.9)[f]	70%
Pap test in the last 3 years (women ≥18 years)	43.1 (37.9, 48.2)*	48.4 (27.9, 67.8)	69.8 (47.8, 85.3)	B	63.9 (58.6, 69.2)	90%
Ever had Colonoscopy (adults ≥50 years)	23.3 (19.1, 28.1)*	31.0 (13.4, 52.4)	28.7 (15.8, 44.2)	ns	34.2 (28.1, 40.3)[g]	50%
Ever tested for HIV	13.4 (11.1, 15.7)*	24.8 (12.2, 41.6)	26.1 (13.7, 39.6)	B	30.9 (27.8, 34.0)	–
Ever tested for TB	59.0 (54.0, 63.9)	69.5 (54.1, 86.7)	87.7 (77.8, 95.5)	ns	–	–

Statistical differences were assessed based on *t* tests with normal approximation and the utilizing the resulting z statistic to obtain *p* values. Unless otherwise specified, survey data estimates are age-adjusted to the US standard population using four age groups: 18–24, 25–44, 45–64, 65+

*$p<0.05$ significant difference observed between surveyed subpopulation and US Asians

A Significant differences between Chinese and Cambodian populations surveyed; *B* significant differences between Chinese and Vietnamese populations surveyed; *C* significant differences between Cambodian and Vietnamese populations surveyed; *ns* no significant differences observed among the three Asian subgroups

[a] Comparison data on arthritis, diabetes, high blood pressure, smoking, obesity, self-rated health, and HIV testing come from the National Health Interview Survey, 2007. Comparison data on insurance, mammography, Pap test, and colonoscopy are from the Agency for Healthcare Research and Quality, National Healthcare Disparities Report, 2007

[b] Healthy People 2010 Reference

[c] Arthritis question for US Asian comparison: ever been told by a doctor or other health professional that they had some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia (National Health Interview Survey, 2007)

[d] High blood pressure question for US Asian comparison: ever been told on two or more different visits that they had hypertension or high blood pressure (National Health Interview Survey, 2007)

[e] Insurance estimates are age-adjusted to the US 2000 standard population using two age groups: 18–44, 45–64

[f] Mammogram estimates are age-adjusted to the US 2000 standard population using two age groups: 40–64, 65+

[g] Colonoscopy question for US Asian comparison: men and women 50 years or older who ever had a colonoscopy, sigmoidoscopy, or proctoscopy (National Health Interview Survey 2007). Survey estimates are age-adjusted to the US 2000 standard population using two age groups: 50–64, 65+.

population, three times as many men reported ever been diagnosed with TB compared to women ($p<0.05$). No differences by gender were observed within the Cambodian or Chinese populations.

In general, older adults were more likely to be diagnosed with chronic conditions; however, Vietnamese adults age 45–64 years were more significantly more likely than other age groups to be diagnosed with diabetes. Among foreign born, adults from all three populations who have lived in the United States for 10 years or more were significantly more likely to be diagnosed with hypertension compared to adults who lived in the United States for less than 10 years. Similar trends were observed among the Chinese population for diagnoses of arthritis and diabetes. Those that spoke English less than "very well" were more likely to be diagnosed with some chronic conditions. For instance, among Chinese adults, 61% of adults who spoke English less than "very well" reported ever being diagnosed with diabetes, compared to 24% of those who spoke English "very well."

Health Risk Factors

Several health risk factors were also assessed. Two were selected for this analysis: the proportion of adults who are current smokers and the proportion of adults who are obese, i.e., have a body mass index (BMI) greater than 30 kg/m^2. The smoking prevalence among Chinese and Cambodian adults was slightly higher than among Vietnamese adults and US Asians (9%). Only the Chinese rate was significantly higher than the US Asian rate. Men were significantly more likely to smoke than women within all three Asian communities surveyed ($p<0.05$). For instance, 31% of Chinese men were current smokers, compared to 1% of women.

Cambodian adults were significantly more likely to be obese (8%) compared to Chinese and Vietnamese adults (4% and 2%, respectively), but similar to the proportion of US Asians who were obese (9%). All four estimates already reached the HP2010 target of 15%. No significant differences were observed for any of the Asian populations surveyed by gender or age for obesity.

Quality of Life Measures

Two questions about quality of life were also examined: self-rated health and activity limitations. Nearly half of Cambodian and Vietnamese adults reported their health to be "fair/poor" compared to 37% of Chinese adults and only 11% of US Asians. Among Vietnamese adults, 59% of those who lived in the USA for 10 years or more reported fair/poor health compared to 64% of those who have lived in the USA for less than 10 years. There were no statistically significant differences in self reported health status in the Chinese or Cambodian communities. All three Asian subgroups were significantly different than Asians nationwide. In addition, adults were asked whether they had experienced activity limitations because of arthritis or joint symptoms. Twice as many Cambodian adults reported such limitations in their usual activities compared to Chinese adults. No significant differences were observed.

Health Care Access

Questions about insurance coverage, cancer screening, and access to HIV and TB testing were also examined. About half of Cambodian and Chinese adults age 18–64 reported that they had health insurance coverage at the time of the survey compared to 64% of Vietnamese adults. The proportion of Cambodian and Chinese adults with insurance was significantly lower than the US Asian estimate as well. Among Cambodian and Vietnamese adults, women were significantly more likely to be

insured than men ($p<0.05$). Younger adults (18–44 years old) in all three groups were least likely to have insurance. Adults 18–64 years old in all three Asian populations who had lived in the United States for 10 years or more were significantly more likely to have any type of insurance compared to those who had lived in the United States for less than 10 years.

The proportion of women age 40 and over who had had a mammogram in the last two years ranged from 43% for Cambodian women to 59% for Vietnamese women. These estimates are similar to the US Asian estimate of 54%, but far from the HP2010 target of 70%. Seventy percent of Vietnamese women reported that they had a Pap test in the past three years compared to 48% of Cambodian women and 43% of Chinese women. The Chinese and Vietnamese estimates were significantly different than the US Asian average (64%), and all estimates were far from the HP2010 target of 90% for cervical cancer screening. Less than one third of all adults ≥50 years old reported ever having had a colorectal exam. Estimates ranged from 23% among Chinese adults to 31% among Cambodian adults. Colorectal screening rates were also substantially lower than the HP2010 target of 50% and US Asian estimate of 34%. Years spent in the United States were positively associated with Chinese women more likely to have had a recent Pap Smear test and Cambodian women more likely to have had a recent mammogram.

Chinese adults were least likely to have ever been tested for HIV (14%) compared to a quarter of Cambodian and Vietnamese adults (25–26%). The Chinese rate was significantly lower than the US Asian estimate (31%). Among Cambodian and Vietnamese population, adults age 25–44 years old were most likely to get tested for HIV compared to adults age 45–64 years old in the Chinese population. Chinese adults reported the lowest proportion of adults ever tested for TB (59%) compared to 70% of Cambodian adults and 88% of Vietnamese adults. The proportion of Chinese adults ever tested for TB was significantly different than the proportion of Vietnamese adults. Differences in access to screening were also observed by language proficiency and years living in the United States. Among Vietnamese adults, only 17% who spoke English less than "very well" reported ever being tested for HIV, compared to 100% of Vietnamese adults who spoke English "very well." The opposite is observed for TB testing. For all three Asian populations, adults who spoke English less than "very well" were significantly more likely to report ever being screened for TB.

DISCUSSION

For the first time, health survey data on disease outcomes and associated risk factors for Cambodian, Chinese, and Vietnamese populations in Chicago are available. These data are important locally to community organizations, researchers, and policy makers in allocating resources, prioritizing health concerns, and improving health. It demonstrates the value of collecting local level data for unique Asian subpopulations who can now participate in the dialogue on health disparities in Chicago. The data also respond to the growing need for baseline information about Asian subgroups in order to participate in national health initiatives and compete for federal funding.

Findings are consistent with the few other studies that confirm heterogeneity within the Asian populations in terms of sociodemographics, health outcomes, and healthcare utilization.[3] Data show that the Chinese, Cambodian, and Vietnamese populations surveyed from Chicago were uniquely different from US Asians not only

in their sociodemographic characteristics, but also in health outcomes. For example, Chinese and Vietnamese populations in Chicago were older, more likely to be foreign born, and reported poorer English proficiency compared to US Asians. Current smoking estimates for all three groups were comparable to US Asian averages but were half the US average. When compared to specific Asian subgroups from other geographic areas, smoking rates in the Chicago communities were better,[11,21,22] positive skin tests for tuberculosis were comparable,[23] and cancer-screening utilization was far worse.[21,24] Survey data also indicate that the health data for US Asians are inadequate to reveal the health of Asian subgroups in smaller geographic areas. Although some indicators among the three Asian subgroups surveyed were similar to US Asian estimates, there was substantial variation among the populations and US Asian estimates, adding to the growing number of studies advocating for disaggregated data.

Survey findings are consistent with many recent studies dispelling the "model minority" myth. They disprove the perception that Asian Americans uniformly have access to medical care and have better health outcomes than other racial and ethnic groups. In fact, Chicago's survey data for the Chinese, Cambodian and Vietnamese populations offer data that describe their unique experiences of health services and outcomes, including inadequate cancer screening, a disproportionate burden of tuberculosis, and a high proportion reporting fair/poor self-rated health.

In addition, these survey data offer for the first time a means for the Chinese, Cambodian, and Vietnamese populations in Chicago to track their progress toward reaching HP2010 goals. Recent analyses comparing the ten largest racial and ethnic health disparities in the United States suggest that of the 183 indicators (out of 498) for which data were available, Asians had the best group rate for 44% of these indicators.[25] While the averages may suggest Asians are a "model minority," our local survey data suggest that serious health concerns such as poor cancer-screening utilization may be masked by aggregated data at the national level. Survey data presented here offer baseline data for three Asian subgroups in Chicago to measure progress toward HP2010 targets.

Methodological Strengths and Considerations

There are a few methodological considerations to discuss. First, data were self-reported and could be either over- or under-estimated; however, all comparison data were likewise self-reported, so any bias could be assumed to be consistent. Second, study findings were not collected to be generalizable to all Chinese, Cambodian, or Vietnamese populations in Chicago. However, the surveys were conducted among the highest concentrations of these Asian subpopulations based on the 2000 US Census and were designed with input from community organizations. The findings are representative of the sample for each surveyed area and have captured health measures of relatively understudied populations. Third, most national health surveys are not offered in Asian languages and thus miss non-English speaking respondents and potentially recent immigrants. There is a desperate need to capture differences in language, acculturation, and immigration patterns because these factors influence health outcomes.[26] The fact that the Asian surveys described herein were offered and most often administered in non-English further adds strength to our study. US Asian rates in this study were thus used for the lack of better comparison data.

Lastly, RDS has emerged as an important scientific sampling technique and is being used extensively among hidden populations.[16,17] The methodologies described here offer an alternative means of conducting population health surveys, particularly

for populations with a small sample size. To our knowledge, this is the first time RDS has been used to complete a health survey for Asians subpopulations within an urban setting. We thus briefly describe the biases associated with using RDS compared with conventional household sampling methods. In conventional probability sampling, the assumption is that an individual's probability of selection is constant and known and additionally that within each strata of selection that the probability of each sample is known. In contrast to conventional probability methods, which attempt to make direct inference from the sample to the population, RDS uses the sample to characterize the social network that is then used to make inferences about the population. It assumes that the social network information gathered from participants is nondifferentially misclassified. For example, that all individuals in the study sample are equally likely to over- or under-estimate the size of their social network. RDS also assumes that a path exists that links all individuals in the population and that no person is completely isolated from other members of the population. Finally, RDS assumes that all participants receive and use one coupon and that when participants recruit others they do so randomly from all persons within their network (conditioned on strata of relationship type). Based on these assumptions, RDS has been shown to provide asymptotically unbiased estimates of the proportion of the population with an outcome of interest.[27] Thus, while the sampling methods are different, the disease outcomes and health measures collected from this sampling frame are considered comparable for these analyses.

Implications

Health data about the Chinese, Cambodian, and Vietnamese populations demonstrate the need for public health agencies to study the health status of specific racial and ethnic subpopulations. Data offer grant makers and researchers information on where to target their resources and concentrate their efforts. They also give Asian populations in Chicago the opportunity to more effectively describe their health needs, guide their program planning and evaluation, and take action. For instance, survey data have helped local community organizations advocate to funds to address the high rates of diabetes in the Cambodian and Vietnamese populations. These baseline data have directly informed the planning of this pilot project to develop culturally and linguistically competent educational outreach for improved management and control strategies for those diagnosed with diabetes. In addition, the low rates of cancer screening that were documented by this data were also revealed as a major health concern in all three communities. Chicago cancer awareness advocacy groups are thus partnering with the three Asian communities to increase the awareness of screening strategies by creating tailored breast and cervical cancer toolkits that community health workers and health advocates can use as training and development documents.

The goal of this paper is to show the importance of local data for Asian subgroups. While only a subset of the rich data collected are presented here, future research can examine the specific barriers facing each surveyed population and its implications for programming. The study also demonstrates how local data can be collected for populations with small sample sizes, even when they are not concentrated in one area and may be difficult to find. The unique methods described offer an alternative for surveying small subpopulations that are often overlooked in large, diverse urban settings. In addition, the efforts put forth by the community-based organizations and the study partners illustrate that the Chicago community values the health of its unique Asian populations. By understanding their health,

Chinese, Cambodian, and Vietnamese communities can engage in the political discussion around health disparities in Chicago, advocate for resources, and make improvements to their health one community at a time.

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