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Cardiovascular Risk in Middle-Aged and Older Immigrants: Exploring Residency Period and Health Insurance Coverage

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Abstract

Purpose: It is reported that while immigrants are, initially, healthier than the native-born upon resettlement, this advantage erodes over time. In the United States, uninsured aging immigrants are increasingly experiencing severe complications of cardiovascular disease (CVD). The purpose of this study was to compare overall CVD risk and explore the importance of health insurance coverage on CVD risk relative to other health access barriers, from 2007 to 2012, in recent and long-term immigrants >50 years of age.

Methods: This study was based on secondary cross-sectional analysis of the National Health and Nutrition Examination Survey (N = 1,920). The primary outcome, CVD risk category (high or low), was determined using the American College of Cardiology and American Heart Association Pooled Cohort equation. Differences between immigrant groups were examined using independent-samples t tests and chi-square analysis. The association between insurance and CVD risk was explored using a hierarchical block logistic regression model, in which variables were entered in a predetermined order. Changes in pseudo R^2 measured whether health insurance explained variance in cardiac risk beyond other variables.

Results: Recent immigrants had lower overall CVD risk than long-term immigrants but were twice as likely to be uninsured and had higher serum glucose and lipid levels. Based on regression models, being uninsured contributed to CVD risk beyond other health access determinants, and CVD risk was pronounced among recent immigrants who were uninsured.

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Conclusions: Health insurance coverage plays an essential part in a comprehensive approach to mitigating CVD risk for aging immigrants, particularly recent immigrants whose cardiovascular health is susceptible to deterioration.

Clinical Relevance: Nurses are tasked with recognizing the unique social and physical vulnerabilities of aging immigrants and accounting for these in care plans. In addition to helping them access healthcare coverage and affordable medication, nurses and clinicians should prioritize low-cost lifestyle interventions that reduce CVD risk, especially diet and exercise programs.

Globally, 12% of migrants are over the age of 65 years, and 70% of them live in developed countries (United Nations Department of Economic and Social Affairs, 2017). Immigrants who resettle in middle or older age (herein defined as age 50+ years) describe great difficulty adapting to their new environment (Wu & Penning, 2015). Since the majority of them do not work or attend school, they lack opportunities to immerse themselves in society, learn a new language, and generate income (O'Neil & Tienda, 2014). This heightens their vulnerability to illness by restricting their access to health care in their adopted country.

In the United States, where the population of immigrants >65 years of age grew by 70% between 1990 and 2010 (Scommegna, 2013), barriers to healthcare access are compounded by limitations on immigrants' ability to obtain comprehensive and affordable health insurance coverage. Lawfully present immigrants who meet federal poverty guidelines must wait a minimum of 5 years after receiving qualified immigration status to be eligible for Medicaid (public insurance for low-income persons) in the majority of states (Choi, 2011); and private plans for aging adults remain costly and largely unaffordable for those with limited incomes (American Association of Retired Persons, 2012). This is not the case in other high-income countries. In Canada, for example, the waiting period for universal government health insurance is no more than 3 months (Government of Canada, 2016); in the United Kingdom, permanent lawfully residing immigrants are entitled to care by the National Health Service (Llano, 2011).

In the United States, a growing number of uninsured immigrants over 50 years of age are presenting to emergency departments (EDs) experiencing preventable, but serious, complications of cardiovascular disease (CVD), such as myocardial infarction (MI) (Stimpson, Wilson, & Eschbach, 2010). Yet, the rise in the number of uninsured middle-aged and older immigrants requiring costly ED care has failed to garner the attention of policymakers, many of whom may subscribe to the "healthy immigrant effect" (Kennedy, Kidd, McDonald, & Biddle, 2015). The healthy immigrant effect purports that immigrants are healthier than the native born during the initial resettlement period, suggesting there is little cost benefit to providing immigrants with health insurance early on. However, within the extant literature, there has been limited research to support this hypothesis, particularly as it relates to CVD in aging immigrants who require frequent routine health screenings (Sadarangani, 2015). There is a substantial body of literature about the positive impact of health insurance on healthcare utilization. However, only a limited number of studies have included immigrants over the age of 65 years (Stimpson, Wilson, Murillo, & Pagan, 2012; Ursua et al., 2014; Wu, Hsieh, Wang, Yao, & Oakley, 2011; Zallman et al., 2013). These studies have found that being uninsured contributes to undiagnosed and poorly controlled

hyperlipidemia and hypertension. However, none of these studies specifically analyzed the relationship of health insurance on older immigrants' health status using clinical indices of CVD risk such as those used here.

Lack of health coverage disproportionately affects recent immigrants in the initial 10 years of resettlement, when they are less likely to be citizens or may be prohibited from accessing public assistance, including Medicaid (Sadarangani, 2015). To address the knowledge gap on the role of health insurance coverage on CVD risk for middle-aged and older immigrants living in the United States, this study compared overall CVD risk and explored the importance of health insurance coverage on CVD risk relative to other health access barriers, from 2007 to 2012, in recent immigrants (in the United States for <10 years) and long-term immigrants (in the United States for >10 years) >50 years of age.

Methods

Study Design and Population

The association between health insurance coverage on CVD risk for middle-aged and older immigrants was investigated through multivariate cross-sectional secondary analysis of data from the 2007 to 2012 National Health and Nutrition Examination Survey (NHANES). The NHANES is conducted by the Centers for Disease Control and Prevention (CDC) and offers clinical and demographic data from a nationally representative sample of community-dwelling adults and children (CDC, 2017). NHANES participants are identified through a complex multistage sampling strategy that randomly selects houses from 15 U.S. neighborhoods based on national census data (CDC, 2017). Individuals first complete in-home screening to verify their eligibility (CDC, 2017). Once confirmed, they provide a full medical history and undergo a complete medical examination by a trained physician, inclusive of laboratory testing at a local mobile examination center (CDC, 2017). Information on NHANES sampling, examination, and laboratory procedures can be found here: https://wwwn.cdc.gov/nchs/nhanes/Default.aspx. In this study, eligible participants were individuals (a) >50 years of age and (b) born outside of the United States. The age of 50 years was selected because it represents a precarious point in the life-course of adults, when the need for many routine health screenings, including laboratory testing for cardiovascular risk factors, begins (Reyes & Hardy, 2015). Subjects who self-reported medical history of coronary disease were excluded. Isolating older immigrants from within the NHANES data and conducting subanalyses on recently arrived immigrants in the United States (i.e., for <10 years) allowed for an in-depth large-scale analysis of a population that is otherwise hard to reach.

Measures

The independent variables are defined and parameterized in Table 1. The dependent variable, CVD risk, was computed using the American College of Cardiology and American Heart Association 2013 Pooled Cohort Risk Assessment Tool for Atherosclerotic Cardiovascular Disease (ASCVD) (herein referred to as the PCE). The PCE is designed to predict 10-year risk for ASCVD events using the following variables: age, gender, race, total cholesterol, high-density lipoprotein (HDL) cholesterol, systolic blood pressure, use of antihypertensive

drug therapy, diagnosis of diabetes mellitus (DM), and smoking status (Preiss & Kristensen, 2015). A risk score of >7.5% indicates moderate ASCVD risk, calling for initiation of statins (Preiss & Kristensen, 2015). The PCE was selected over more traditional estimates of CVD risk, such as the Framingham Risk Score, because it is more comprehensive, includes race and diabetes as risk determinants, and considers stroke as an endpoint. It also accounts for whether or not an individual is being treated for hypertension (Karmali et al., 2014). In validation studies using racially diverse cohorts, inclusive of Asians and Hispanics, the PCE demonstrated C-statistics ranging from 0.56 to 0.77 (DeFilippis et al., 2015). We were unable to locate any estimates of test-retest reliability.

Analytic Strategy

NHANES data were analyzed using SPSS version 23.0 (IBM Corp., Armonk, NY, USA), which contains a special complex survey module that allows users to extrapolate results to the overall U.S. population. Subjects' data were weighted based on the unequal probability of being selected and were adjusted for nonresponse within that participant's sample category. A power analysis was conducted accounting for the NHANES's unique design effects and specifying a minimum statistical power of 0.80. Minimum statistical power required 1,537 participants.

Univariate descriptive statistics were used to examine participant characteristics. Specifically, measures of central tendency were calculated for continuous clinical and demographic variables, and frequencies were used to assess categorical variables, including type of insurance coverage. Subanalyses of demographic and clinical characteristics among recent immigrants (in the United States for <10 years) and long-term immigrants (in the United States for >10 years) were conducted. Independent-samples *t* tests were carried out to explore differences in continuous clinical measures in these groups, while chi-square tests explored differences among categorical variables. Statistical significance was set at $p < .05$.

The importance of health insurance coverage on CVD risk relative to other health access barriers was explored using a hierarchical block logistic regression model. Variables were added in a prespecified block order illustrated in Figure 1. Changes in pseudo R^2 generated by block entry format captured whether health insurance explained variance in cardiac risk beyond other demographic variables (Wilson & Lorenz, 2015). Log-likelihood ratios were calculated to determine goodness-of-fit between the models. In the final block, interactions terms were included to explore the moderating effects of key variables on the focal independent variable, health insurance. Select interactions were entered into the model on the basis of the extant literature on immigration and health insurance in the United States. Policies that require lawfully residing, noncitizen immigrants to wait 5 years before accessing government-sponsored health insurance have created an inextricable link between immigration and health policy. Thus, citizenship and period of residency were selected based on their potential to moderate the effect of health insurance on cardiovascular risk among immigrants. For statistically significant interactions, stratified analyses among categories of citizenship and period of residency were conducted to understand the directional effects of these interactions. Appropriate diagnostic tests were conducted in order to ensure that the

assumptions of logistic regression were not violated. Multicollinearity was measured using the variance inflation factor (VIF).

Results

The sample consisted of 1,920 immigrants, the majority (n = 1,607) of whom were long-term immigrants and had been in the United States for >10 years. While this difference was large, given that the study was sufficiently powered and the sample normally distributed, we inferred the mean of each population from the mean of each sample per the Central Limit Theorem.

Clinical Characteristics

Differences in clinical characteristics and cardiovascular risk factors between recent and long-term immigrants are presented in Table 2. Recent immigrants (M = 59.07 years) were younger than long-term immigrants (M = 61.68 years). Results of physical examination found that recent immigrants had lower body mass index ($p < .001$), systolic blood pressure ($p < .001$), diastolic blood pressure ($p < .001$), and waist circumference ($p < .001$). However, despite being younger and healthier, upon examination, laboratory testing found that recent immigrants had higher plasma glucose levels ($p < .001$), total cholesterol ($p < .001$), and triglycerides ($p < .001$), and lower HDL cholesterol values ($p < .001$) compared to long-term immigrants.

Demographic Characteristics

Differences in the demographic characteristics in recent and long-term immigrants are presented in Table 3. Recent immigrants were less likely to be U.S. citizens ($p < .001$) and more likely to report limited English proficiency ($p < .001$). They were less likely to have a source of routine health care ($p < .001$), but more likely to live in larger households ($p < .001$). Recent immigrants had lower incomes than their long-term counterparts ($p < .001$), and were twice as likely to be uninsured ($p < .001$). Recent immigrants were less likely to self-report diagnoses of DM ($p < .001$) and hypertension ($p < .001$). Using the PCE, a greater proportion of long-term immigrants were at high risk for CVD relative to recent immigrants ($p < .001$).

Type of Health Insurance Coverage

Differences in type of insurance coverage among long-term and recent immigrants are presented in Table 4. The majority of the sample relied on government-sponsored health insurance as opposed to private plans. Long-term immigrants were more often insured by Medicare ($p < .001$), while recent immigrants more often relied on Medicaid ($p < .001$).

Health Insurance Coverage and Cardiovascular Risk

The results of the hierarchical logistic regression model examining the association between health access barriers and CVD risk in older or middle-aged immigrants are presented in Table 5. The block entry format, depicted in Figure 1, specifically sought to explore whether health insurance coverage (first entered in Model 3) contributed to CVD risk above and beyond other access barriers. Lack of health insurance coverage was associated with a 1.7-

fold increase in the likelihood of being at risk for CVD in Model 3 ($p < .05$). The pseudo R^2 increased and the likelihood ratio test was statistically significant ($p < .05$) in Model 3, indicating improved model fit beyond the initial predictors after including health insurance. However, the pseudo R^2 (0.058) suggests significant variance in CVD risk is not explained by the models.

Model 4 included interaction terms. In this final model, each of the variables entered was statistically significant ($p < .05$), with the exceptions of having a routine place to go for healthcare and energy expenditure. In Model 4, using the PCE, the following associations were clear: non-English speakers were less likely to be at high risk for CVD compared to English speakers, though this association was weak. Those with less household support (household of one person) were less likely to be at high risk for CVD compared to those with greater support. Those with lower incomes (income-to-poverty ratio of <1.29 or 1.30–1.84) were less likely to be at high risk for CVD compared to those with higher incomes (income-to-poverty ratio of >1.8). Those who self-reported poor diets were more likely to be at high risk for CVD compared to those who self-reported diets that were excellent/good. VIFs did not exceed 5, indicating low levels of multicollinearity among predictor variables.

In Model 4, interactions between period of residency and health insurance and citizenship status and insurance were statistically significant and negative. For these interactions, separate stratified models were run among citizens and noncitizens and each category of period of residency. Uninsured noncitizens (odds ratio [OR] 1.92, 95% confidence interval [CI] 1.53–2.14) were more likely than uninsured citizens (OR 1.55, 95% CI 1.46–1.64) to be at high risk for CVD. Uninsured immigrants who had been in the United States for <10 years (OR 2.55, 95% CI 1.88–3.45) were more likely to be at high risk for CVD compared to those who had been in the United States for >10 years (OR 1.53, 95% CI 1.35–1.73).

Discussion

This study compared CVD risk factors in recent and long-term immigrants, examined differences in their uninsured rate and type of insurance coverage, and explored the importance of health insurance coverage on CVD risk relative to other health access barriers. Recent immigrants in the United States had lower overall risk for CVD than long-term immigrants using the PCE, which is consistent with multinational studies of immigrants in other high-income countries (Kennedy et al., 2015). While recent immigrants had higher plasma glucose and lipid levels than their counterparts, they were also, on average, 2 years younger. A lower proportion of recent immigrants at high risk for CVD, despite elevated glucose and lipid levels, may be a consequence of age, which is weighted heavily in the PCE calculation (Grundy, 2012). However, tools used to estimate CVD risk, like the PCE, are often problematic in immigrant populations because they rely solely on clinical measures and do not account for social determinants of health that may thwart access to care and increase risk. This is particularly salient here because in our sample, recent immigrants were far more socially disadvantaged than long-term immigrants. In addition to having low rates of insurance coverage, recent immigrants were almost entirely noncitizens and were more likely than long-term immigrants to report low incomes, limited English proficiency, and a

lack of routine health care. All of these factors challenge immigrants' ability to access care at a time when risk factors for CVD may emerge.

In our final multivariate analysis, health insurance, unlike other variables in the model, was a consistently high-magnitude and statistically significant predictor of CVD risk for all immigrants. The addition of health insurance to the models demonstrated that lack of insurance may contribute to cardiac risk over and above other factors that restrict health access. Stratified analyses among categories of citizenship and period of residency, for statistically significant interactions, consistently showed that uninsured noncitizens and uninsured recent immigrants had greater odds of being at high risk for CVD than uninsured citizens and uninsured long-term immigrants. The significance of these interactions underscores the heightened protective effect of health insurance among vulnerable noncitizens and recent immigrants. Being a citizen creates a political standing that provides additional protective benefits for immigrants. However, for recent immigrants, who are disenfranchised and poorly acculturated, health insurance acts as an equalizer of sorts, attenuating the effects of lower socio-economic status and language barriers.

More than half of recent immigrants (54%) in our sample had no health insurance. This is a stark contrast to the overall U.S. population, in which 12.8% of the nonelderly population is uninsured, and less than 1% of people over 65 years of age are uninsured (Kaiser Family Foundation, 2016). Insurance plays a critical role in increasing access to certain types of preventive services, especially laboratory testing, inclusive of lipid and glucose screenings, which were elevated among recent immigrants. Uninsured persons are less likely to use preventive screenings for CVD, causing them to delay or forgo treatment (Alcala et al., 2015).

Both recent and long-term immigrants relied heavily on public insurance programs for coverage. This underscores the important role government policies play in allowing immigrants access to health coverage. Among recent immigrants, there was heavier reliance on Medicaid than Medicare. Recent immigrants are ineligible for Medicare unless they have paid payroll taxes for 10 years or more (Smith-Dewey, 2015). A substantial proportion of recent and long-term immigrants were enrolled in private plans; however, the data do not enable analysis of the level of services provided by these plans. Many private plans are criticized as being focused on catastrophic illness rather than prevention. These plans have high out-of-pocket costs, which may reduce uptake of services among individuals seeking preventive care to identify or delay CVD and other chronic disease (Fox & Shaw, 2015). Thus, in the United States, Medicaid, which is means tested, may represent a more affordable insurance option for immigrants with limited financial resources. On a global level, evidence suggests that lengthy waiting periods for public insurance may have negative health consequences.

Health disparities among older immigrants are the product of factors such as racism, discrimination, and political disenfranchisement that extend far beyond health insurance. Many developed nations, including Canada and the United Kingdom, continue to see health disparities among immigrant minorities despite providing new immigrants with health insurance. However, affordable healthcare coverage plays an essential part in a

comprehensive approach to reducing health disparities for aging immigrants. The findings from our study, which are supported by others done in Canada (Siddiqi, Zuberi, & Nguyen, 2009), the United Kingdom (Liu, Cook, & Cattan, 2017), and Australia (Martinson & Reichman, 2016) suggest that insurance may attenuate some of the negative consequences of resettlement for older immigrants, without eliminating them.

Limitations

This study was limited by a number of factors. First, the cross-sectional design prohibits causal inference with respect to the association between lack of health insurance coverage and CVD risk. Second, these particular data do not enable analysis of differences among ethnic and racial subgroups. Asians were only oversampled in the 2011–2012 NHANES cycle, leaving an insufficient number for reliable subgroup analysis. Also, participants' country of origin was not assessed in two out three NHANES cycles. There is significant heterogeneity in clinical risk within each of these groups resulting from ethnic and cultural differences, particularly with respect to dietary habits (Guerrero & Chung, 2015). Grouping all racial and ethnic groups together may have inadvertently biased the findings. Third, health access may not have been explored comprehensively since not all barriers immigrants face (e.g., discrimination) were captured within the dataset (Derose, Escarce, & Lurie, 2007). Although our models control for factors that are supported by theory and previous research on immigrants, they do not fully explain CVD risk in older immigrants. Variables, including family history, living conditions in the host country, and educational attainment, need to be explored in future studies.

Conclusions

The findings from this study suggest that aging immigrants, especially the recently arrived, are an at-risk population whose risk for a cardiovascular event is potentially heightened as a result of being uninsured. The unique stressors of migration in later life coupled with limited opportunities to assimilate are compounded by unfamiliar and complex medical systems. Fear around the cost of care may prevent many from seeking care until a health condition becomes emergent and often more expensive to treat. Nurses, who have long served as advocates for vulnerable populations, are tasked with recognizing the unique social and physical vulnerabilities of older immigrants and accounting for these in care plans. This includes ensuring access to affordable medications and recognizing cultural expectations around health care. Based on the study's findings, nurses should also prioritize low-cost lifestyle interventions that reduce CVD risk, especially diet and exercise. In this study, immigrants had low levels of physical activity, and diet was a statistically significant, high-magnitude predictor of elevated cardiac risk. Therefore, it is essential that nurses counsel immigrants on diet and exercise and help them access healthful culturally appropriate foods. These efforts may prevent the progression of patients from high risk to high acuity and can be successful in the absence of health insurance.

However, nurses may be less likely to find older immigrants in formal primary care settings since their access to health care is restricted. Community and nurse partnerships are essential in helping recent immigrants meet their ongoing healthcare needs. Targeted initiatives

include helping them enroll in health insurance programs and dismantling myths that public assistance programs jeopardize citizenship opportunities.

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References

Alcala HE, Albert SL, Roby DH, Beckerman J, Champagne P, Brookmeyer R, … Ortega AN (2015). Access to care and cardiovascular disease prevention. Medicine, 94(34), e1441. doi:10.1097/MD.0000000000001441 [PubMed: 26313803]

American Association of Retired Persons. (2012). Health insurance costs and coverage for 50 to 64 year olds. Retrieved from https://www.aarp.org/health/health-care-reform/info-02-2012/health-insurance-costs-for-older-adults-before-medicare.html

Carr S, & Tienda M (2013). Family sponsorship and late-age immigration in aging America: Revised and expanded estimates of chained migration. Population Research and Policy Review, 32(6), 825–849. doi:10.1007/s11113-013-9300-y

Centers for Disease Control and Prevention. (2017). National Health and Nutrition Examination Survey. Retrieved from https://www.cdc.gov/nchs/nhanes/index.htm

Choi SH (2011). Testing healthy immigrant effects among late life immigrants in the United States: Using multiple indicators. Journal of *Aging and Health*, 24(3), 475–506. doi:10.1177/0898264311425596 [PubMed: 22108546]

Derose KP, Escarce JJ, & Lurie N (2007). Immigrants and health care: Sources of vulnerability. Health Affairs, 26(5), 1258–1268. doi:10.1377/hlthaff.26.5.1258 [PubMed: 17848435]

Fox JB, & Shaw FE (2015). Clinical preventive services coverage and the affordable care act. American Journal of Public Health, 105(1), e7–e10. doi:10.2105/AJPH.2014.302289

Government of Canada. (2016, August 22). Canada's health care system. Retrieved from https://www.canada.ca/en/health-canada/services/canada-health-care-system.html#a3

Grundy SM (2012). Pre-diabetes, metabolic syndrome, and cardiovascular risk. Journal of the American College of Cardiology, 59(7), 635–643. doi:10.1016/j.jacc.2011.08.080 [PubMed: 22322078]

Guerrero AD, & Chung PJ (2015). Racial and ethnic disparities in dietary intake among California children. Journal of the Academy of Nutrition and Dietetics, 116(3), 439–448. doi:10.1016/j.jand.2015.08.019 [PubMed: 26433453]

Kaiser Family Foundation. (2016, September 15). Key facts about the uninsured population. Retrieved from http://kff.org/uninsured/fact-sheet/key-facts-about-the-uninsured-population/

Kennedy S, Kidd MP, McDonald JT, & Biddle N (2015). The healthy immigrant effect: Patterns and evidence from four countries. Journal of International Migration and Integration, 16, 317–332. doi:10.1007/s12134-014-0340-x

Llano R (2011). Immigrants and barriers to healthcare: Comparing policies in the United States and United Kingdom. Retrieved from https://web.stanford.edu/group/sjph/cgi-bin/sjphsite/immigrants-and-barriers-to-healthcare-comparing-policies-in-the-united-states-and-the-united-kingdom/

Liu X, Cook G, & Cattan M (2017). Support networks for Chinese older immigrants accessing English health and social care services: The concept of bridge people. Health & Social Care in the Community, 25(2), 667–677. [PubMed: 27188976]

Martinson ML, & Reichman NE (2016). Socioeconomic inequalities in low birth weight in the United States, the United Kingdom, Canada, and Australia. American Journal of Public Health, 4, 748–754. doi:10.2105/AJPH.2015.303007

O'Neil K, & Tienda M (2014). Age at immigration and the incomes of older immigrants. Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 70(2), 291–302. doi:10.1093/geronb/gbu075

Preiss D, & Kristensen SL (2015). The new pooled cohort equations risk cohort. Canadian Journal of Cardiology, 31(5), 613–619. doi:10.1016/j.cjca2015.02.0001 [PubMed: 25843167]

Reyes AM, & Hardy M (2015). Health insurance instability among older immigrants: Region of origin disparities in coverage. Journals of Gerontology, Series B: Psychological Sciences and Social Sciences, 70(2), 303–313. doi:10.1093/geronb/gbu218

Sadarangani TR (2015). Policy implications of a literature review of cardiovascular disease in uninsured immigrant older adults. Journal of Gerontological Nursing, 41, 14–20. doi:10.3928/00989134-20150410-01

Scommegna P (2013). Elderly immigrants in the United States. Today's Research on Aging, 29, 1–9. Retrieved from http://www.prb.org/pdf13/TodaysResearchAging29.pdf

Siddiqi A, Zuberi D, & Nguyen QC (2009). The role of health insurance in explaining immigrant versus non-immigrant disparities in access to health care: Comparing the United States to Canada. Social Science and Medicine, 69(10), 1452–1459. doi:10.1016/j.socscimed.2009.08.030 [PubMed: 19767135]

Smith-Dewey C (2015, March 5). Can recent immigrants to the United States get health coverage if they're over 65? Retrieved from https://www.medicareresources.org/faqs/can-recent-immigrants-to-the-united-states-get-health-coverage-if-theyre-over-6

Stimpson JP, Wilson FA, & Eschbach K (2010). Trends in health care spending for immigrants in the United States. Health Affairs, 29(3), 544–550. doi:10.1377/hlthaff.2009.0400 [PubMed: 20150234]

Stimpson JP, Wilson FA, Murillo R, & Pagan JA (2012). Persistent disparities in cholesterol screening among immigrants to the United States. International Journal for Equity in Health, 11(1), 22. doi:10.1186/1475-9276-11-22 [PubMed: 22545672]

United Nations Department of Economic and Social Affairs. (2017, November). International migration report. Retrieved from http://www.un.org/en/development/desa/population/migration/publications/migrationreport/docs/MigrationReport2017_Highlights.pdf

Ursua R, Aguilar D, Wyatt L, Tandon SD, Escondo K, Rey M, & Trinh-Shevrin C (2014). Awareness, treatment and control of hypertension among Filipino immigrants. Journal of General Internal Medicine, 29(3), 455–462. doi:10.1007/s11606-013-2629-4 [PubMed: 24113806]

Wilson JR, & Lorenz KA (2015). Hierarchical logistic regression models. In: Modeling binary correlated responses using SAS, SPSS and R (pp. XXX–XXX). ICSA Book Series in Statistics, vol. 9 Cham, Switzerland: Springer.

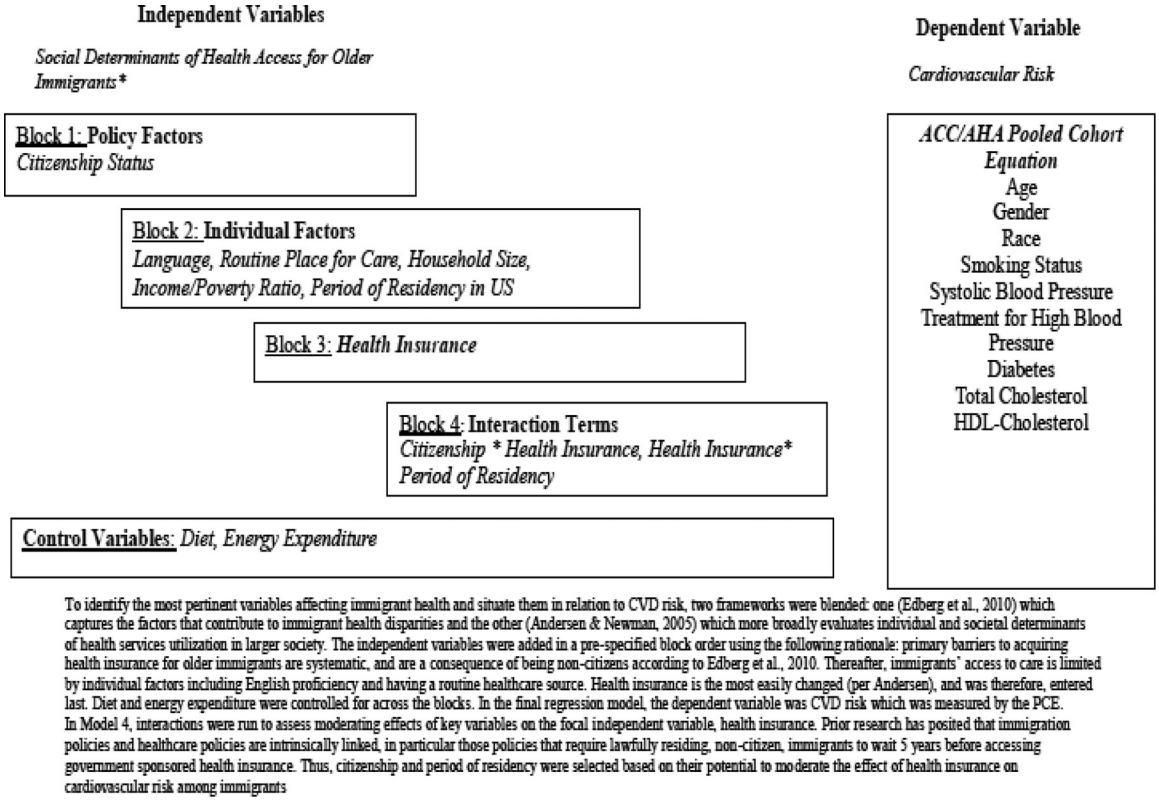
Wu TY, Hsieh HF, Wang J, Yao L, & Oakley D (2011). Ethnicity and cardiovascular risk factors among Asian Americans residing in Michigan. Journal of Community Health, 36(5), 811–818. doi:10.1007/s10900-011-9379-1 [PubMed: 21380579]

Wu Z, & Penning M (2015). Immigration and loneliness in later life. Ageing & Society, 35(1), 64–95. doi:10.10107/S0144686X13000470

Zallman L, Himmeltstein DH, Woolhandler S, Bor DH, Ayanian JZ, Wilper A, & McCormick D (2013). Undiagnosed and uncontrolled hypertension and hyperlipidemia among immigrants in the US. Journal of Immigrant and Minority Health, 15(5), 858–865. doi:10.1007/s10903-012-9695-2 [PubMed: 22915055]

Clinical Resources

- U.S. Citizenship and Immigration Services. Resources for new immigrants: Health care and families. https://www.uscis.gov/tools/settling-us/health-care-and-families
- U.S. Committee for Refugees and Immigrants. Healthy living toolkit. http://refugees.org/research-reports/



To identify the most pertinent variables affecting immigrant health and situate them in relation to CVD risk, two frameworks were blended: one (Edberg et al., 2010) which captures the factors that contribute to immigrant health disparities and the other (Andersen & Newman, 2005) which more broadly evaluates individual and societal determinants of health services utilization in larger society. The independent variables were added in a pre-specified block order using the following rationale: primary barriers to acquiring health insurance for older immigrants are systematic, and are a consequence of being non-citizens according to Edberg et al., 2010. Thereafter, immigrants' access to care is limited by individual factors including English proficiency and having a routine healthcare source. Health insurance is the most easily changed (per Andersen), and was therefore, entered last. Diet and energy expenditure were controlled for across the blocks. In the final regression model, the dependent variable was CVD risk which was measured by the PCE. In Model 4, interactions were run to assess moderating effects of key variables on the focal independent variable, health insurance. Prior research has posited that immigration policies and healthcare policies are intrinsically linked, in particular those policies that require lawfully residing, non-citizen, immigrants to wait 5 years before accessing government sponsored health insurance. Thus, citizenship and period of residency were selected based on their potential to moderate the effect of health insurance on cardiovascular risk among immigrants

Figure 1.
Study variables and order of entry into hierarchical block regression.

Table 1.

Definition and Parameterization of Independent Variables

Variable	Definition	Continuous vs. categorical	Value label
Citizenship status	Citizens as a result of birth in the United States or its territories or through naturalization	Categorical	[1] Citizen [2] Noncitizen
Language	Language of interview	Categorical	[0] Non-English [1] English
Routine place for care	Having a place to go when sick or in need of advice about health	Categorical	[1] Yes [2] No
Household size	The number of people in the participants' household	Categorical	[1] = 1 (lives alone) [2] = 2 [3] = 3+
Income/poverty ratio	Calculated by dividing family incomes by poverty guidelines, specific to family size, as well as the appropriate year and state	Categorical	[1] <1.34 [2] 1.35–1.85 [3] >1.85
Period of residency in United States	The number of years the participant has lived in the United States. Participants were asked the month and year when they came to the United States to stay.	Categorical	[0] ≤10 years [1] >10 years
Health insurance coverage	Covered by any type of health insurance	Categorical	[1] Yes [2] No
Diet	Self-rated dietary habits	Categorical	[1] Fair/poor [2] Excellent/very good/ good
Energy expenditure	Participants estimated the amount of time they spent per week performing moderate and vigorous physical activity. Each activity received a metabolic equivalent of task (MET) score. The MET score was multiplied by the product of the number of sessions each week and the average number of minutes each session lasted.	Continuous	0–1,000

Table 2.

Cardiometabolic Characteristics in Recent Immigrants (in United States ≤10 years) vs. Long-Term Immigrants (in United States >10 years) 50 Years of Age and Older

Category	Recent immigrants (*n* = 242)		Long-term immigrants (*n* = 1,607)	
	Mean (SE)		Mean (SE)	
Age (years)	59.07	(0.26)	61.68 *	(0.12)
Total cholesterol (mg/dL)	207.6	(0.55)	205.27 *	(0.31)
HDL (mg/dL)	50.74	(0.19)	52.71 *	(0.07)
Body mass index (kg/m^2)	26.92	(0.07)	27.82 *	(0.06)
Systolic BP (mmHg)	127.84	(0.17)	128.50 *	(0.13)
Diastolic BP (mmHg)	66.24	(0.95)	67.29 *	(0.32)
Fasting plasma glucose (mg/dL)	112.14	(0.35)	110.80 *	(0.32)
Waist circumference (inches)	36.85	(0.18)	37.61 *	(0.09)
Triglycerides (mg/dL)	141.19	(0.67)	137.78 *	(1.1)

Note. BP = blood pressure; HDL = high-density lipoprotein; SE = standard error.

* $p < .001$.

Table 3.

Health Access Determinants and Other Risk Factors for Cardiovascular Disease in Recent Immigrants (in United States <10 years) vs. Long-Term Immigrants (in United States >10 years) 50 Years of Age and Older

Category	Recent immigrants (*n* = 242)	Long-term immigrants (*n* = 1,607)
Noncitizens	89%	28%*
Non-English speakers	95%	58%*
No routine place for health care	36%	12%*
Household size < 3	26.2%	48.0%*
Income to poverty ratio < 1.85	59.5%	41.9%*
No health insurance coverage	54%	22%
Gender (female)	54%	53%
Race (Hispanic, Black, other)	92%	78%
Current smokers	23%	22%*
Self-reported diet is fair or poor	21%	20%
Do not meet recommended PA guidelines[a]	92%	95%*
Hypertension (self-reported)	35%	42%*
Diabetes mellitus (self-reported)	12%	18%*
Takes medication for hypertension	11%	15.5%
Takes medication for hypercholesterolemia	4%	27.8%*
Takes oral medication for diabetes mellitus	14.3%	17.9%*
Takes insulin for diabetes mellitus	2.6%	3.7%*
Pooled risk score > 7.5%	47%	58%*

[a]PA = physical activity; reflects guidelines set forth by the American Heart Association.

*$p < .001$.

Table 4.

Type of Insurance Coverage Among Insured Immigrants ≥50 Years of Age

	Long-term immigrant (*n* = 1,272)	Recent immigrants (*n* = 224)
Private insurance	47.90%	46.30% *
Medicare	26.40%	12.90% *
Medi-Gap	0.80%	0.00% *
Medicaid	11.6%	25.80% *
Military/Veterans Administration–sponsored plan	3.20%	0.00% *
State-sponsored plan	3.30%	11.60% *
Single-service plan	2.30%	1.80% *
Other government plan	4.40%	1.60% *

* $p < .001$.

Table 5.

Hierarchical Logistic Regression Models Estimating Effects of Health Insurance on ACC/AHA Pooled Risk Score in Immigrants 50+ Years of Age (n = 1,920)

	Model 1			Model 2			Model 3			Model 4		
	B (SE)	OR	95% CI	B (SE)	OR	95% CI		OR	95% CI	B (SE)	OR	95% CI
	0.27 * (0.02)	1.31	1.26–1.36	0.17 * (0.04)	1.19	1.10–1.27		1.10	1.03–1.18	−0.32 * (0.08)	0.73	0.62–0.86
Language [b]				−0.06 (0.04)	0.94	0.87–1.03	Citizenship status [a]	0.90	.83–.98	−0.10 * (0.04)	0.91	0.83–0.99
Routine place for health care [c]				0.17 * (0.05)	1.18	1.07–1.30	−0.07 (0.06)	0.94	.83–1.05	−0.06 (0.05)	0.94	0.83–1.06
Household size [d]												
Lives alone				−0.46 * (0.10)	0.63	0.52–0.76	−0.46 * (0.09)	0.63	.53–.75	−0.46 * (0.09)	0.63	0.53–0.76
2 people				−0.29 * (0.03)	0.75	0.70–0.79	−0.27 * (0.03)	0.77	.72–.82	−0.27 * (0.03)	0.76	0.72–0.81
Income/poverty ratio [e]												
≤1.29				−0.41 * (0.04)	0.66	0.61–0.72	−0.46 * (0.09)	0.63	.58–.69	−0.46 * (0.04)	0.63	0.58–0.69
1.30–1.84				−0.40 * (0.04)	0.67	0.63–0.72	−0.47 * (0.03)	0.63	.58–.69	−0.47 * (0.05)	0.63	0.57–0.69
Period of residency in United States [f]				0.41 * (0.03)	1.51	1.42–1.61	0.36 * (0.04)	1.43	1.33–1.54	0.74 * (0.09)	2.09	1.75–2.49
Insurance coverage [g]							0.53 * (0.06)	1.70	1.52–1.91	0.80 * (0.13)	2.22	1.72–2.86
Insurance * period of residency [i]										−0.68 * (0.19)	0.51	0.35–0.73
Citizenship * insurance [j]										−0.45 * (0.04)	0.63	0.57–0.69
Diet (self-reported quality)	0.27 * (0.01)	1.30	1.27–1.33	0.46 * (0.04)	1.59	1.47–1.71	0.44 * (0.04)	1.55	1.43–1.67	0.45 * (0.04)	1.57	1.44–1.72
Energy expenditure (1,000 kcal)	0.002 (0.00)	1.00	1.00–1.01	0.002 (0.00)	1.00	1.00–1.01	0.00 (0.00)	1.00	1.00–1.01	0.007 (0.002)	1.00	0.99–1.01
Constant	−0.48 * (0.03)			−0.09 (0.05)			−0.39 * (0.06)			−0.40 * (0.07)		
Pseudo R^2	[.010]			[.042]			[.053]			[.058]		
Log-likelihood	13,827,674			11,593,583.50			11,513,987.74			11,481,103.24		
Likelihood ratio				χ^2 critical (df = 7) = 20.28 *			χ^2 critical (df = 1) = 7.879 *			χ^2 critical (df = 3) = 12.84 *		

Note. ACC/AHA = American College of Cardiology/American Heart Association; CI = confidence interval; OR = odds ratio; SE = standard error.

Reference groups:

[a] citizen;

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[b] English;

[c] yes,

[d] three or more;

[e] ≥1.85;

[f] >10 years;

[g] yes;

[h] citizen/>10 years;

[i] citizen/insured;

[j] insured/>10 years.

* $p < .05$.