



Article

Disability, food insecurity by nativity, citizenship, and duration

Claire E. Altman^{a,*}, Colleen M. Heflin^b, Hannah Akanksha Patnaik^b^a University of Missouri, USA^b Syracuse University, USA

ARTICLE INFO

Keywords:

NHANES
Disability
Food insecurity
Immigrants
Citizenship

ABSTRACT

Prior research examines the prevalence of either disability *or* food insecurity among immigrants. We examine whether the presence of a disability operates as a stronger predictor of food insecurity among prime-aged immigrants relative to the US-born. Probit models estimate the relationship of disability with food insecurity among immigrants and distinguish by duration of US residence and citizenship status using nationally representative data from the National Health and Nutrition Examination Survey (NHANES) spanning 1999 to 2014. Descriptively, food insecurity was highest among non-citizen immigrants with longer durations of US residence, compared to non-citizen immigrants with shorter durations and naturalized immigrants. Multivariate results suggest that among Hispanics, the association between disability and food insecurity was stronger among immigrants compared to US-born adults; the disability-food insecurity association varied by an immigrant's duration of US residence and citizenship status. The results emphasize the importance of disaggregating by citizenship status and duration of US residence.

Introduction

As the foreign-born population becomes more settled in the United States, researchers are particularly focused on immigrants' prospects for socioeconomic wellbeing. Food security is of interest because it provides a direct assessment of whether individuals and households have the ability to secure sufficient nutritionally-adequate or safe foods (Anderson, 1990). Food insecurity, as a measure of material hardship, captures processes related to well-being and stratification beyond income (Heflin, 2017). Nationally, more than one in ten households is food insecure (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2018) and immigrants' rates exceed those of nonimmigrant households (Kaushal, Waldfogel, & Wight, 2014; Maynard et al., 2018; Rabbitt, Smith, & Coleman-Jensen, 2016). Given that national-level, immigrant-specific food security data are limited, estimates of food insecurity for immigrants range from 30 to 60 percent (ConAgra Foods Foundation, 2016) compared to 12 percent nationally (Coleman-Jensen et al., 2018). Among the largest and one of the fastest growing groups in the US, foreign-born Hispanics have higher rates of food insecurity than US-born non-Hispanic whites (25% vs. 17%, respectively) (Myers & Painter, 2017) and Hispanic immigrant households with children face particularly high rates (Chilton, Black, Berkowitz, & Casey, 2008).

Moreover, food insecurity is a correlate of poor health (Chávez,

Telleen and Kim 2007), exhibiting a consistent association with disability status. Individuals and households with an adult with a disability face disproportionately higher rates of food insecurity than households without a person with a disability (Heflin et al., 2018; Brucker, 2016; Brucker & Coleman-Jensen, 2017; Coleman-Jensen & Nord, 2013; Sonik, Parish, Ghosh, & Igdalsky, 2016). Stated differently, among low-income individuals reporting food insecurity with hunger, 43 percent reported a work limitation in the past year (She & Livermore, 2007). Prior research has examined the prevalence of disabilities among immigrants *or* food insecurity among immigrants (Myers & Painter, 2017), but has not yet examined the intersection. We use nationally representative data from National Health and Nutrition Examination Survey (NHANES) from 1999 to 2014 to examine the relationship between disability and food insecurity among immigrants. Our novel contributions to the literature include assessing whether the presence of a disability operates as a stronger predictor of food insecurity among prime-aged immigrants, ages 19 to 59, than among the US-born and further distinguishing by duration of US residence and citizenship status.

Background

In general, working-age immigrants have lower rates of disability compared to the US-born (Kennedy, McDonald, & Biddle, 2006).

* Corresponding author. 501 Clark Hall, Department of Health Sciences, University of Missouri, Columbia, MO, 65211, USA.

E-mail address: altmanc@health.missouri.edu (C.E. Altman).

Additionally, the association between disability and food insecurity is more consistent and detrimental among working-aged adults compared to older adults (Brucker & Coleman-Jensen, 2017; Coleman-Jensen & Nord, 2013). For prime-aged adults, work-limiting disabilities may interfere with their ability to generate and sustain financial resources. Moreover, fewer formal governmental programs or supports protect working-aged adults, and particularly those with a disability, from food insecurity compared to older adults (i.e., Meals on Wheels, The Older Americans Act Nutrition Program) (Brucker & Coleman-Jensen, 2017). Recent research suggests that multiple pathways exist between disabilities and food insecurity for prime-aged adults. For example, physical limitations are thought to obstruct a person's ability to buy, transport, and/or prepare food; cognitive limitations may thwart the ability to plan or juggle household expenses; and trouble hearing may limit social efficacy and social interactions. In a sample of US working-age adults, work limitations, functional limitations, trouble managing money, mobility limitations, and trouble seeing and hearing were significantly associated with increased risk of food insecurity (Heflin et al., 2018).

Disability and food insecurity among immigrants

Specific to the foreign-born population, there are several reasons to expect a tighter association between disability and food insecurity compared to US-born populations. First, immigrants consistently have lower rates of health insurance coverage compared to US-born adults; unauthorized immigrants are particularly disadvantaged (Derose, Bahney, Lurie, & Escarce, 2009; Yang & Hwang, 2016). Moreover, foreign-born Hispanic and noncitizen Hispanics have higher rates of being uninsured compared to non-Hispanic whites (Buchmueller, Levinson, Levy, & Wolfe, 2016; Durden & Dean, 2013). Immigrants have lower rates of employer sponsored insurance (ESI) coverage, are less likely to work for firms that offer insurance, and when offered ESI enroll at lower rates (Buchmueller, Lo Sasso, Lurie, & Dolfin, 2007; Ponce, Cochran, Mays, Chia, & Richard Brown, 2008). Furthermore, many immigrants are ineligible and/or excluded from Medicaid or health insurance expansion under the Affordable Care Act (Ku & Bruen, 2013; Wallace, Torres, Sadegh-Nobari, & Pourat, 2013).

Without insurance, US adults often lack a routine source of care (Hoffman, Schoen, Rowland, & Davis, 2001; Schoen & DesRoches, 2000). Specifically, Hispanic immigrants are less likely than the US-born to have a routine source of health care (Derose et al., 2009; Ortega et al., 2007). Without routine care, health concerns are delayed and frequently remain undiagnosed, untreated, and unmanaged. This can lead to disability-related complications and more complex care often delivered in costly facilities such as emergency departments (Hadley, 2003; Sudano, Joseph, & Baker, 2003). Despite receiving care in high-cost settings, as a result of limited insurance and health care access, immigrants have lower overall health care utilization (Stimpson, Wilson, & Su, 2013). Consequently, immigrants face restricted access to health insurance and care that might treat or lessen the impact of a disability on food insecurity.

Second, persons with disabilities incur direct and indirect costs when managing a disability, which are not incurred by non-disabled households (Mitra, Palmer, Kim, Mont, & Groce, 2017; Pumkam, Probst, Bennett, Hardin, & Xirasagar, 2013). Direct costs include health care services, devices, or technologies that assist a person to compensate for a disability (e.g., health care appointments, medication, hearing aids, mobility tools, etc.), as well as transportation services and supports; indirect costs account for forgone wages and time at employment. Immigrants, Hispanic specifically, pay a higher share out-of-pocket for health expenditures (Bustamante & Chen, 2012; Derose et al., 2009). One potential consequence of the high, out-of-pocket direct costs related to disability management is that immigrants forgo spending on other household needs, such as food, which has been documented as the "treat or eat" trade-off in a nationally representative sample (Berkowitz, Seligman, & Choudhry, 2014).

Immigrants generally and those with disabilities have lower health expenditures than US-born adults and less health care use which may result in forgone care, services, or treatments (Tarraf, Mahmoudi, Dillaway, & González, 2016) and be a reflection of their social position, lower socioeconomic status, or dearth of wealth and financial resources to draw upon to offset the extra expenses related to having a disability (Painter & Qian, 2016). With fewer financial resources on average, having a disability may increase an immigrant's vulnerability to experiencing food insecurity.

Third, immigrants are less likely to receive nutritional assistance through food assistance programs than non-immigrants. Most immigrant non-citizens are ineligible for federal food assistance benefits, such as the Supplemental Nutritional Assistance Program (SNAP), although five states provide state funded food assistance benefits (The Pew Charitable Trusts, 2014). Notwithstanding exceptions to the federal rules (i.e. Cuban or Haitian entrants as defined by the 501(e) Refugee Education Assistance Act of 1980 or lawful permanent residents with a military connection or, etc.) (USDA Food and Nutrition Service, 2013), many qualified immigrants are now afraid to receive benefits for which they are eligible due to fears that benefit receipt will hurt future applications for US citizenship. Finally, even though non-qualified immigrants are ineligible for federal benefits, their income is used for determining the eligibility of other members of the household. Consequently, participation in mixed status households is lower than in non-immigrant households. Using the 2012 Census data, Ku and Bruen (2013) estimated that among low-income households, 25% of naturalized citizens, 29% of non-citizen immigrants, and 33% of US citizens lived in households receiving SNAP benefits in 2011.

Variation by citizenship and duration of US residence

To date, no nationally representative study accounts for disability status when examining food insecurity among immigrants. Moreover, studies have not disaggregated by citizenship status or duration of US residence. For example, Kashul and colleagues' assess food insecurity among immigrants and children of immigrants, but only control for whether at least one parent reports a disability (Kaushal et al., 2014). Additionally, Myers and Painter examine food insecurity rates among adults and provide comparisons by nativity, but do not account for disability, citizenship, or duration of US residence (Myers & Painter, 2017). However, it is likely that the relationship between disability and food insecurity varies by citizenship status and duration of residence in the United States.¹

It is expected that the association between disability and food insecurity will be stronger among non-citizens compared to the foreign-born who are naturalized citizens. Analysis of the Current Population Survey (CPS) suggests that food insecurity is higher among non-citizens Hispanics than citizen Hispanics (24 percent versus 18 percent, respectively) (Rabbitt et al., 2016). Further, naturalized immigrants have increased access to formal and informal social and governmental programs that could reduce the impact of a disability on the experience of food insecurity.

In the United States, Disability Insurance (DI) and Supplemental Security Income (SSI) are the primary governmental supports for disabled adults by providing monthly cash benefits (Burwell, Preston, & Bailey, 1990). DI is available to adults with a disability who have acquired work credits to offset lost wages and earnings due to a mental or physical disability, while SSI eligibility rests on having limited income. Importantly, adults with disabilities have lower rates of employment compared to adults without disabilities; and therefore, perhaps are more reliant of formal financial supports (Boursiquot & Brault, 2013). Almost

¹ The NHANES provides years in the US for foreign-born respondents categorically; small sample sizes prohibit an examination of foreign-born jointly by citizenship and duration.

one-third of all adults receiving any type of governmental assistance reported having at least one disability and more than one-in-five adults with a disability receive DI and about 17 percent receive SSI—reinforcing the financial needs faced by this vulnerable population (Boursiquot & Brault, 2013; Houtenville & Brucker, 2014). DI, SSI, and other social safety net programs limit eligibility based on citizenship (U.S. Centers for Medicare & Medicaid Services, 2016).² Even when qualified, immigrants often have lower participation rates in formal social programs (Derose, Escarce, & Lurie, 2007; Ruffing, 2015). With limited and/or restricted access to these types of programs and assistance, households might face difficult decisions regarding household bills, medical needs, and meeting other basic needs, such as food.

Second, we expect the association between disability and food insecurity will vary by an immigrant's duration of US residence. Here we specifically distinguish between immigrants who have been in the US for less than five years versus five or more years. This cut point is common in the literature and represents the required length of residence to apply for naturalization (U.S. Citizenship and Immigration Services, 2019). Five years of residence is also a proxy for the length of time required to access to formal social programs that might reduce the impact of a disability on food insecurity, such as SNAP.

Duration of US residence remains underexplored as a risk factor for food insecurity. Limited studies show that food insecurity rates are higher among the foreign-born with shorter durations of US residence (Maynard et al., 2018; Quandt et al., 2006; Rabbitt et al., 2016). With increasing US duration, immigrants acquire more human and social capital (Chiswick, Cohen, & Zach, 1997; Waldinger & Roger, 1997). The human capital gains likely come with better paying jobs and more favorable residential locations. Over time, immigrants learn where to access support for food or medical needs, often through social networks and religious organizations (Leclere, Jensen, & Biddlecom, 1994). These may reduce the impact of a disability on food hardship. Conversely, empirical evidence demonstrates that immigrants' health declines with increasing duration of US residence (Abraido-Lanza, Chao and Florez 2005; Cho, Parker Frisbie, Hummer, & Rogers, 2004), commonly referred to as negative health assimilation (NHA). The adoption of sedentary behaviors, the standard American diet, and other lifestyle norms often erode any initial health advantage that an immigrant had upon arrival to the US. Also, immigrants' employment is often physically demanding and dangerous (Dong & Platner, 2004; McCauley, 2005; Pransky et al., 2002). Nationally representative studies show that immigrants who have lived in the US longer have higher rates of disability compared to immigrants with shorter US stays (Engelman, Kestenbaum, Zuelsdorff, Mehta, & Lauderdale, 2017). Therefore, health declines with increased US duration may negate human capital gains.

Data

This study utilizes the continuous collection of the National Health and Nutrition Examination Survey (NHANES) spanning 1999 to 2014, which is the most current sample containing food security measures. The National Center for Health Statistics has administered the repeated cross-sectional NHANES annually since 1999. The NHANES is a nationally representative survey which collects demographic, survey, examination, laboratory, and nutrition data from 5000 adults and children in the United States. Following the established literature, we pool the cross-sectional samples together and use the NHANES survey weights harmonized across collection periods to adjust for complex survey

² Unauthorized immigrants are eligible for a limited number of social programs often in select US states such as emergency medical services reimbursed through Medicaid, The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and The Children's Health Insurance Program Reauthorization Act (CHIPRA). Additionally, there are some social programs with shorter waiting periods such as CHIPRA.

design. Given the focus on the prime-age adult population, we limit the sample to adults aged 19 to 59. To account for missing data, we use listwise deletion resulting a final sample size of 26,187.

Measures

Food insecurity

The NHANES includes the validated 18-item Food Security Survey Module constructed by the US Department of Agriculture. Households that do not report any problems or anxiety about consistent access to food are classified as food secure. Following the literature, we classify households as marginally food insecure if they report one or two items and households as food insecure if they report three or more items about reduced quality, variety, desirability, or quantity.

Disability measures

NHANES participants self-reported about their ability to perform tasks or activities. Prior research using NHANES constructs four disability categories: sensory, mobility, cognitive, and work limitations (Heflin et al., 2018). Sensory limitations indicate whether a respondent reports that their hearing is excellent or good versus having a little trouble, a lot of trouble, or are deaf. We include five measures of mobility limitations: Activities of Daily Living (ADL); Instrumental Activities of Daily Living (IADL); mobility limitations, functional limitations, and trouble seeing. ADL includes four items measuring difficulty walking room-to-room on the same level, getting in-and-out of bed, eating, or dressing. IADL includes two items reporting difficulty doing household chores or meal preparation. Mobility limitations reports difficulty walking one-quarter of a mile and walking up 10 steps without resting. Functional limitations include difficulties completing seven tasks related to stooping, crouching, or kneeling; lifting or carrying 10 pounds; standing from an armless chair; standing for a long time; reaching over head; and grasping or holding small objects. Cognitive limitations are identified using two measures: trouble managing money and memory loss or confusion. Work limitations includes any self-reported physical, emotional, or mental health issue that limited or prevented work.

Foreign-born, citizenship, and duration in the United States

We classify adults who report being born outside of the United States as foreign-born. Using follow-up questions, we distinguish foreign-born respondents based on self-reported citizenship status which is limited to citizen versus non-citizen. Further, foreign-born respondents provide information regarding the length of time they have been in the US with categorical response options. To ensure sufficient sample sizes and as a requirement of the naturalization process, we distinguish between immigrants who have been in the US less than five years versus five or more years. Using the information about citizenship and duration, we construct three foreign-born categories: non-US born individuals who have lived in the US for less than five years (assumed to be non-citizens based on naturalization requirements) (NUSBL5); non-US born, non-citizens who have been in the US for five or more years (NUSBNC5); and non-US born citizens who have been in the US for five or more years (NUSBC5). These foreign-born groups are compared to respondents born in the US. Given the focus on Hispanics, we used ethnicity information to construct an indicator for Hispanics. We use this to identify US and foreign-born respondents of Hispanic origin.

Controls

Our models include a standard set of socio-demographic correlates of food insecurity. Gender is coded as a dummy variable (1 = female). We categorize educational attainment as less than high school, high school

degree or GED, some college or an Associate's Degree, and college or beyond. NHANES provides a constructed categorical measure of income in \$5000 categories from \$0-\$4999 to \$75,000. The midpoint of each category was multiplied by the respective years' inflation rate and then logged. Marital status is categorized as married or living with a partner, widowed, divorced, or separated, and single. An indicator of household SNAP participation is dichotomized. Household size is measured as containing one, two, three, or four or more residents.

Analysis

First, we descriptively examining disability type by nativity, citizenship, and duration of US residence. We do this for all respondents and separately for Hispanics. Then, we turn to multivariate probit models to estimate the association between these disability types and food insecurity. We run separate models for each of the immigrant groups and for the full sample. All analyses are weighted in STATA to account for the complex survey design of the NHANES.

Results

Table 1 presents the descriptive results for the prevalence of food insecurity and disabilities for all prime-aged adults, ages 19–59. Compared to US-born respondents, foreign-born respondents report higher rates of food insecurity, with the two non-citizen 0–5 and 5+ duration groups reporting the highest rates (33.6% and 43.2%, respectively). Foreign-born citizens have food insecurity rates similar to those of the US-born (22.3% vs. 21.2%). Across disabilities, foreign-born respondents generally report lower rates. Comparing non-US born, non-citizens, there is descriptive evidence that respondents with longer duration of US residence report higher disability rates which may reflect aging processes. Yet, when comparing immigrants with similar durations of US residence, the non-US born citizens do not exhibit a consistent citizen health advantage associated with lower disability rates. Citizen immigrants have lower rates of trouble seeing, 12.7% vs. 15.5% (F-test, $p > 0.0355$), but higher ADL 0.09 vs. 0.06 (F-test, $p > 0.0355$), IADL (F-test, $p > 0.0125$), mobility 0.5 vs. 0.03 (F-test, $p > 0.0593$), and functional limitations 0.31 vs. 0.22 (F-test, $p > 0.0114$).

The descriptive results for Hispanics in **Table 2** show similar patterns, but notably higher rates of food insecurity, regardless of nativity. Using the broad measure, 36% of US-born Hispanics and 33% of non-US born citizens report food insecurity and 48.7% of non-US born non-citizens with less than 5 years and 52% of non-US born non-citizens with 5 or more years report food insecurity. Rates of food insecurity do not appear to decline with duration among the foreign-born non-citizens, but the naturalized foreign-born respondents have lower rates of food insecurity compared with foreign-born non-citizen peers with similar US durations of residence.

Similar to the full sample, the non-US born Hispanics report lower rates of disability than US-born Hispanics. Among non-US born non-citizen Hispanics, respondents in the longer duration category report slightly higher rates of disability. Comparisons among foreign-born Hispanics with five or more years of US residence suggests that the citizens have slightly lower rates of seeing (16.6% vs. 17.3%) and memory limitations (3.9% vs. 4.6%), but otherwise the non-citizens report less disability, though notably not statistically different.

Next, we turn to probit models presenting marginal effects of the association between disabilities and food insecurity using the broader measure for prime-aged adults residing in a household that endorses 1 or 2 items from the Food Security Module. This broader measure may include individuals in households where access to food is a serious

concern, but have not yet experienced food consumption shortages.³ **Table 3** is for the full sample and **Table 4** is restricted to the Hispanic-only sample. In each table, we present the results of five separate fully-controlled and weighted models for each nativity/citizenship/duration group.

Table 3, Model 1 for all prime-age adults presents a consistent, positive association between many types of disabilities and food insecurity. Having trouble hearing, a functional limitation, trouble seeing, trouble managing money, memory loss, or a work limitation are all positively associated with increases in the risk of food insecurity in the full sample. The largest effect size is for trouble seeing which is associated with a 4.85 percentage point increase in the risk of food insecurity. The full sample results appear to be driven largely by the US-born as shown in Model 2, with the exception of memory loss which is no longer statistically significant. The results in Models 3–5 suggest limited associations between disability and food insecurity among the full sample of foreign-born respondents. For instance, among non-US born non-citizens with less than five years in the US, trouble seeing is associated with a 6.83 percentage point decrease in the likelihood of food insecurity but an almost 5 percentage point increase for non-US born, non-citizens who have been in the US for five or more years, and work limitations are associated with a 9 percentage point decrease in the likelihood of food insecurity among non-US born citizens who have been in the US for five or more years.

When the sample is restricted to Hispanics, stronger patterns emerge (**Table 4**). Among all Hispanics, having trouble hearing or memory loss are associated with about a 6 percentage point increase in the likelihood of food insecurity. For US-born Hispanics, having a work limitation is significantly associated with an 8.8 percentage point increase in the risk of food insecurity. For the non-US born, non-citizens with less than five years of US residence, trouble hearing, mobility limitations, and functional limitations are significantly associated with increases in the probability of food insecurity while ADL, and IADL are associated with decreases in the probability of food insecurity. For the non-citizens with five or more years of US residence, trouble hearing, trouble seeing, and memory loss are significantly, positively associated with food insecurity. For citizens living in the US for five or more years, trouble seeing is negatively associated with food insecurity while trouble managing money is positively associated with food insecurity.

We assessed the sensitivity of our results to alternate coding schemes for disability measures, particularly in comparison with the American Community Survey (ACS) which is commonly used to study disabilities. Importantly, disabilities in the NHANES and ACS are not always operationalized using equivalent indicators. However, when the indicators for disability items align between the ACS and NHANES, the prevalence rates in the NHANES replicate those in the ACS. Furthermore, the NHANES uses a broader definition of what constitutes trouble seeing and trouble hearing compared to the ACS. Following precedent in the literature using the NHANES, our coding of trouble hearing and seeing allows for a more sensitive measure of sensory disability, based on our focus on these health issues as a barrier to food security, which is likely a lower threshold to being problematic in other aspects of life, such as working. Using the more restrictive ACS definition of trouble hearing or seeing does lead to changes in the magnitude and significance of the sensory disability results given their lower prevalence, though not in ways that systematically advantage or disadvantage any particular group.

Discussion

Prior research established a strong association between disability

³ Probit models using the stricter indicator of food insecurity, in which a household endorses 3 or more items, produced substantively similar results (available from the authors).

Table 1
Descriptive statistics respondents age 19–59, 1999–2014 NHANES.

Variable	Total Sample	US-Born	Non-US Born, Non-Citizens			Non-US Born, Citizens		
			0–5 years	5+ years	5+ years	5+ years		
Broader Measure of Food Insecurity (%)	23.03	21.18	33.58 ^a	***	43.21 ^a	***	22.27	
Stricter Measure of Food Insecurity (%)	14.95	13.71	20.60 ^a	***	29.07 ^a	***	14.85	
Sensory Limitations								
Trouble Hearing (%)	16.27	17.25	8.26 ^a	***	10.21 ^a	***	11.83 ^a	***
Mobility Limitations								
ADL Limitation	0.12	0.13	0.02 ^a	***	0.06 ^a	***	0.09 ^a	**
IADL Limitation	0.09	0.10	0.03 ^a	***	0.04 ^a	***	0.06 ^a	***
Mobility Limitation	0.08	0.08	0.01 ^a	***	0.03 ^a	***	0.05 ^a	***
Functional Limitation	0.45	0.49	0.15 ^a	***	0.22 ^a	***	0.31 ^a	***
Trouble Seeing (%)	14.29	14.34	13.31		15.51		12.65 ^a	*
Cognitive Limitations								
Trouble managing money (%)	3.70	4.01	1.11 ^a	***	1.67 ^a	***	2.28 ^a	***
Memory loss or confusion (%)	4.74	4.93	2.13 ^a	***	4.29 ^a		3.30 ^a	***
Work Limitations								
Physical, mental and emotional health (%)	12.82	13.82	5.26 ^a	***	7.24 ^a	***	7.23 ^a	***
N	25,383	19,604	1044		2646		1908	

Note: Weighted descriptive statistics. a = a statistically significant difference from the US-born sample mean.

Table 2
Descriptive statistics Hispanics only age 19–59, 1999–2014 NHANES.

Variable	Total Sample	US-Born	Non-US Born, Non-Citizens			Non-US Born, Citizens		
			0–5 years	5+ years	5+ years	5+ years		
Broader Measure of Food Insecurity (%)	42.27	36.34	48.65 ^a	***	52.02 ^a	***	32.52	
Stricter Measure of Food Insecurity (%)	27.36	21.70	31.66 ^a	***	35.27 ^a	***	22.79	
Sensory Limitations								
Trouble Hearing (%)	12.04	14.22	10.23 ^a	**	10.73 ^a	***	10.44 ^a	***
Mobility Limitations								
ADL Limitation	0.10	0.15	0.02 ^a	***	0.07 ^a	***	0.10 ^a	*
IADL Limitation	0.06	0.10	0.01 ^a	***	0.04 ^a	***	0.06 ^a	***
Mobility Limitation	0.05	0.08	0.01 ^a	***	0.03 ^a	***	0.05 ^a	**
Functional Limitation	0.34	0.50	0.11 ^a	***	0.23 ^a	***	0.31 ^a	***
Trouble Seeing (%)	17.18	17.53	17.15		17.29		16.55	
Cognitive Limitations								
Trouble managing money (%)	3.12	4.89	0.71 ^a	***	1.76 ^a	***	2.65 ^a	***
Memory loss or confusion (%)	4.70	5.74	2.42 ^a	***	4.55 ^a	*	3.86 ^a	**
Work Limitations								
Physical, mental and emotional health (%)	9.62	13.21	5.26 ^a	***	7.22 ^a	***	8.07 ^a	***
N	6514	2727	664		2093		889	

Note: Weighted descriptive statistics. a = a statistically significant difference from the US-born sample mean.

status and food insecurity (Heflin et al., 2018; Brucker, 2016; Brucker & Coleman-Jensen, 2017; Coleman-Jensen & Nord, 2013; Drew, 2015; Sonik et al., 2016). However, an important gap exists as to date, researchers have not examined whether the relationship between disability status and food insecurity is stronger among the foreign-born compared to US-born adults. Furthermore, it remains unknown how the association between disability status and food insecurity varies by duration of US residence or citizenship and particularly among Hispanic-origin immigrants. We provide a novel contribution by distinguishing between citizens and non-citizens to testing these ideas in descriptive and multivariate analyses.

Descriptively we found high rates of food insecurity among non-citizen immigrants compared to naturalized immigrants and the US-born. Moreover, the naturalized immigrants have food insecurity rates similar to those of the US-born. These results were evident in the full sample and among Hispanics. Our results suggest that the experience of food insecurity varies by duration as found by others (Maynard et al., 2018; Quandt et al., 2006; Rabbitt et al., 2016), but without separating duration of US residence groups by citizenship important patterns are missed. In particular, naturalized immigrants with 5 or more years in the US have lower rates of food insecurity than immigrants with less than 5 years, but among the non-citizens, those with shorter durations have lower rates of food insecurity than those with longer durations. Our results emphasize the importance of disaggregating by citizenship status

and duration of US residence.

The multivariate results further illustrate the nuanced story about disability and food security by nativity. For the full sample, few disabilities are predictive of food insecurity for the non-US born respondents while many types of disabilities are positively associated with food insecurity among US-born adults (trouble hearing, functional limitations, trouble seeing, trouble managing money, and work limitations). When the sample is restricted to Hispanics, the results are more pronounced and follow our expectations, though there are a few instances when disabilities are negatively associated with food insecurity. We hypothesized that the association between disability and food insecurity would be stronger among the foreign-born compared to the US-born which was generally found in the Hispanic sample. Among US-born Hispanics, only trouble hearing and work limitations are significantly associated with food insecurity. Second, we anticipated the disability-food insecurity association would be stronger for non-citizens compared to the foreign-born who are naturalized citizens, which was also confirmed among Hispanics. Finally, we expected the association between disability and food insecurity to vary by an immigrant’s duration of US residence, yet did not hypothesize a direction. Given sample size limitations, we distinguished between immigrants in the US for less than five years and those with five or more years. For Hispanics, the association between disability and food insecurity is most notable among non-US born, non-citizens with less than five years of US

Table 3
 Probit models of food insecurity for individuals aged 19 to 59, NHANES 1999–2014.

Variables	Marginal Effects							
	Full		US Born		NUSBL5	NUSBNC5		NUSBC5
Sensory Limitations								
Trouble hearing	0.0236 (0.00879)	***	0.0215 (0.00914)	**	0.0818 (0.0552)	0.0469 (0.0281)	*	0.0122 (0.0317)
Mobility Limitations								
ADL limitation	-0.00299 (0.00686)		-0.00238 (0.00691)		-0.0129 (0.0988)	0.0165 (0.0402)		-0.0134 (0.0355)
IADL limitation	0.00794 (0.00946)		0.00774 (0.00974)		-0.181 (0.125)	0.0141 (0.0588)		0.0121 (0.0515)
Mobility limitation	-0.00909 (0.00837)		-0.0117 (0.00842)		0.0587 (0.0787)	0.0436 (0.0522)		0.0482 (0.0422)
Functional limitation	0.00870 (0.00370)	**	0.00850 (0.00381)	**	0.0151 (0.0304)	-0.0140 (0.0184)		0.0185 (0.0228)
Trouble seeing	0.0485 (0.00739)	***	0.0532 (0.00792)	***	-0.0683 (0.0404)	0.0494 (0.0274)	*	-0.0209 (0.0246)
Cognitive Limitations								
Trouble managing money	0.0436 (0.0160)	***	0.0466 (0.0162)	***	-0.211 (0.111)	-0.0291 (0.0816)	*	0.0587 (0.0676)
Memory loss or confusion	0.0299 (0.0132)	**	0.0213 (0.0137)		0.0954 (0.0869)	0.0672 (0.0494)		0.0881 (0.0633)
Work Limitations								
Physical, mental and emotional health	0.0334 (0.0112)	***	0.0367 (0.0116)	***	0.0505 (0.0770)	0.0568 (0.0489)		-0.0908 (0.0480)
Observations	25,383		19,604		1044	2646		1908

Note: Model (1) is on the full sample of all prime-aged individuals, (2) US-born individuals, (3) NUSBL%: non-US born individuals who have lived in the US for 0–5 years, (4) NUSBNC5: non-US born non-citizens who have been in the US for 5+ years and (5) NUSBC5: non-US born citizens who have been in the US for 5+ years. Food insecurity is measured at the household level, and being food insecure is defined by marginal, low, and very low food insecurity. All results are weighted using NHANES weights for combined cycles. Models include controls for gender, education, household income, marital status, SNAP participation and household size. Standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

residence, though the patterns were not uniform.

The results raise important points regarding race/ethnicity, citizenship, and duration of US residence. Interestingly, disabilities are associated with food insecurity among foreign-born Hispanics, but not all foreign-born respondents. This may be a data artifact based on our inability to make refined country or region comparisons due to data restrictions with the public-use NHANES. Notably heterogeneity among Hispanics is also obscured in the NHANES, though the relationship between disability and food insecurity persists. Critically, the results also highlight the racialized nature of citizenship status on health and hardship disparities (Asad & Clair, 2018) and the continued significance of race/ethnicity on wellbeing (Jiménez, 2008).

Trouble hearing provides an interesting case about race/ethnicity and citizenship. Prior research on US adults generally finds that trouble hearing is associated with food insecurity (Heflin et al., 2018). Among Hispanics, trouble hearing is positively associated with food insecurity for all groups. This supports previous research finding that Mexicans are less likely to have a hearing test compared to other race/ethnic groups likely due to lower rates of health insurance coverage, Hispanics have higher odds of hearing loss compared to blacks, and low SES is tightly linked to hearing loss (Crowson, Schulz, & Tucci, 2016; Emmett & Francis, 2015) while stressing the need to disaggregate Hispanics by nativity when data permits. Furthermore, even though Hispanic non-US born citizens report trouble hearing at similar rates to Hispanic non-US born non-citizens with similar durations of US residence, trouble hearing is not a significant predictor of food insecurity among the naturalized. It is likely that naturalized Hispanic immigrants have higher SES and more financial resources to offset the direct cost of a hearing disability. It is also possible that the findings reflect disparities in health insurance coverage and access to care such that non-US born, non-citizens' trouble hearing may go undiagnosed or unmonitored due to

lack of insurance or routine source of health care. Trouble hearing is associated with reduced self-efficacy, social interactions, and social functioning and an increased need for social support (Pichora-Fuller, Mick and Reed 2015; Schneider et al., 2010; Tarasuk, Mitchell, McLaren, & McIntyre, 2013; Wallhagen, Strawbridge, Shema, Kurata, & Kaplan, 2001) which may exacerbate the experience of food insecurity particularly among racialized non-citizen Hispanic immigrants.

Limitations under the broad category focused on mobility-related issues offer additional insight about duration and citizenship patterns for Hispanics. For Hispanic non-US born, non-citizens with less than five years in the US, both ADL and IADL limitations are negatively associated with food insecurity. ADL and IADL are measures of realized disability status. These limitations typically indicate that one is unable to complete tasks of daily living necessitating care and support, providing an explanation for the negative association. On the other hand, functional and mobility limitations, trouble seeing, and trouble managing money may represent vulnerabilities that go unrecognized and/or unsupported because the disability is not fully realized or the bearer takes actions to conceal the disability. These types of functional limitations have been shown to precede disability (Nagi, 1976; Verbrugge & Jette, 1994). While this group of recent Hispanic immigrants may be younger or positively selected on health, they may also be acutely vulnerable to food insecurity. As immigrants with less than five years in the US, they remain ineligible for formal social programs or DI/SSI that might mitigate the risk of food insecurity associated with concealed or unmanaged mobility limitations that partially disrupt their ability to complete daily tasks. As recent arrivals, they may also lack the knowledge, social capital, or networks to access informal supports. At the macro level, the current exclusionary and restrictive climate towards non-citizen immigrants likely exacerbates patterns of food insecurity.

Moreover, the limited significant associations between disabilities

Table 4
 Probit models of food insecurity for Hispanic individuals aged 19 to 59, NHANES 1999–2014.

Variables	Marginal Effects									
	Full		US Born	NUSBL5	NUSBNC5	NUSBC5				
Sensory Limitations										
Trouble hearing	0.0646 (0.0221)	***	0.0552 (0.0327)	*	0.154 (0.0692)	**	0.0607 (0.0332)	*	0.0350 (0.0535)	
Mobility Limitations										
ADL limitation	-0.0165 (0.0252)		-0.0144 (0.0310)		-0.281 (0.138)	**	0.0398 (0.0419)		-0.0327 (0.0641)	
IADL limitation	0.0355 (0.0359)		0.0153 (0.0458)		-0.426 (0.189)	**	0.0397 (0.0666)		0.0994 (0.0929)	
Mobility limitation	0.00189 (0.0284)		-0.00104 (0.0341)		0.418 (0.153)	***	-0.0202 (0.0606)		0.0216 (0.0953)	
Functional limitation	0.0146 (0.0137)		0.0237 (0.0186)		0.157 (0.0546)	***	-0.0281 (0.0229)		0.0277 (0.0419)	
Trouble seeing	0.00809 (0.0216)		-0.00570 (0.0271)		-0.0848 (0.0529)		0.0748 (0.0355)	**	-0.0739 (0.0437)	*
Cognitive Limitations										
Trouble managing money	-0.0167 (0.0442)		-0.0351 (0.0517)		0.293 (0.228)		-0.0703 (0.0948)		0.259 (0.147)	*
Memory loss or confusion	0.0585 (0.0348)	*	0.0288 (0.0561)		-0.0907 (0.144)		0.103 (0.0540)	*	0.0689 (0.110)	
Work Limitations										
Physical, mental and emotional health	0.0504 (0.0386)		0.0880 (0.0489)	*	0.0159 (0.0954)		0.0596 (0.0646)		-0.127 (0.102)	
Observations	6514		2727		664		2093		889	

Note: Model (1) is on the full sample of all Hispanic prime-aged individuals, (2) US-born Hispanic individuals, (3) NUSBL5: non-US born individuals who have lived in the US for 0–5 years, (4) NUSBNC5: non-US born non-citizens who have been in the US for 5+ years and (5) NUSBC5: non-US born Hispanic citizens who have been in the US for 5+ years. Food insecurity is measured at the household level, and being food insecure is defined by marginal, low, and very low food insecurity. All results are weighted using NHANES weights for combined cycles. Models include controls for gender, education, household income, marital status, SNAP participation and household size. Standard errors in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1.

and food insecurity for non-US born citizens in the full sample and among Hispanics is noticeable. Naturalization is not random; immigrants are selected based on factors including SES. Though descriptively non-US born citizens have disability rates similar to non-US born non-citizens with similar durations, having a disability is not associated with food insecurity. As found for other wellbeing outcomes, naturalization may operate directly or as a proxy for SES resources and access to formal social programs. Furthermore, for Hispanic non-US born citizens, the association with food insecurity is negative for trouble seeing but positive for managing money. For Hispanics and all immigrants, trouble seeing is negatively associated with food insecurity for less than 5 years, but positively for 5+. These results may reflect an anomaly due to small sample sizes or a confusing pattern requiring additional research.

While these results fill an important gap in our understanding of the association between disability and food insecurity among immigrants, there are limitations. First, though the NHANES is a preeminent health survey with numerous measures and details regarding disability status, it includes much less immigration-related information. Therefore, we are unable to move beyond a citizen/non-citizen dichotomy which likely obscures the increasing heterogeneity in the foreign-born population. Further, the measure of US duration of residence is imprecise due to the categorization of years in the US. However, we do leverage the data about place of birth and years in the US to construct three foreign-born categories, thus extending prior research. Also, confidentiality and sample size concerns limit the detail available regarding country or region of birth. Additionally, food insecurity is measured at the household level and identifies limitations in accessing healthy foods because of affordability than accessibility (Wolfe, Frongillo, & Pascale Valois, 2003). This approach is common in the literature and plausible given the shared experience of residing in a household. Furthermore, while non-US born respondents descriptively have lower rates of disabilities

compared to the US-born respondents, affirming immigrants' positive health selection, with cross-sectional data we are unable to fully examine selection processes. Disability rates across immigrant groups may also be a function of age given that naturalization requires at least five years of US residence. Therefore, the non-US born respondents may on average be older than non-US born, non-citizens or more acutely experience negative health acculturation. Finally, disability patterns could also signal salmon bias, whereby migrants are selected into return migration based on health. For instance, the non-citizens with longer durations who remain in the US may appear healthier than ones who have returned (and thus not in our sample).

These results have several important implications for practice and policy. Primarily, food insecurity and health are intricately linked. Access to food programs aimed at reducing disparities in food security need to account for the disproportionate experience of people with disabilities. Food assistance programs should focus on groups with overlapping vulnerabilities such as non-citizens and particularly those who arrived to the US recently. Programs should focus on targeting recent arrivals though outreach to worksites, community centers, and churches as this group may have limited access to other sources of support because of legal eligibility or out of fear. However, the implementation of these types of policies is unlikely given the current federal policy regime. In particular, the current federal government has sought to limit immigrants' access to the social safety net, particularly among low-income immigrants. Further, under proposed reforms, immigrants who utilize programs like SNAP could experience difficulties obtaining residency documents in the future (McHugh, 2018). Though the so-called 'public charge' determination has not taken effect, rumors of its impact on future legal/citizenship status has had a chilling effect even on those who are eligible for benefits (Bernstein, McTarnaghan, & Gonzalez, 2019).

The findings for Hispanic non-US born, non-citizens with less than five years in the US should raise concerns for health policy makers. While an unknown portion of this recent arrival group may return to their country of origin, immigrants are remaining in the US for longer periods of time (Passel & Cohn, 2016). With more time in the US, these recent arrivals will age into disability status (Garcia, Downer, Crowe, & Markides, 2017) potentially as a consequence of physically demanding jobs with high rates of occupational injury rather than chronic disease (Dong & Platner, 2004, Toussaint-Comeau 2006). The result is extended years living with a disability and a high burden of disability in self-care (Hayward, Hummer, Chiu, González-González, & Wong, 2014). As our results suggest this disability burden may also impact their food security.

Ethics

Ethics approval is not required for this paper given that it uses publicly available National Health and Nutrition Examination Survey (NHANES) data available online from the CDC.

Declaration of competing interest

No potential conflict of interest was reported by the authors.

CRediT authorship contribution statement

Claire E. Altman: Conceptualization, Writing - original draft, Writing - review & editing. **Colleen M. Heflin:** Conceptualization, Writing - review & editing. **Hannah Akanksha Patnaik:** Formal analysis, Writing - review & editing.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmph.2020.100550>.

References

- Abraido-Lanza, Ana, F., Chao, M. T., & Florez, K. R. (2005). Do healthy behaviors decline with greater acculturation?: Implications for the Latino mortality paradox. *Social Science & Medicine*, 61(6), 1243–1255.
- Anderson, S. A. (1990). Core indicators of nutritional state for difficult-to-sample populations. *Journal of Nutrition*, 120(11S), 1557–1600.
- Asad, A. L., & Clair, M. (2018). Racialized legal status as a social determinant of health. *Social Science & Medicine*, 199, 19–28.
- Berkowitz, S. A., Seligman, H. K., & Choudhry, N. K. (2014). Treat or eat: Food insecurity, cost-related medication underuse, and unmet needs. *The American Journal of Medicine*, 127(4), 303–310. e3.
- Bernstein, H., McTarnaghan, S., & Gonzalez, D. (2019). *Safety net access in the context of the public charge rule: Voices of immigrant families*. Washington, DC: Urban Institute.
- Boursiquot, B. L., & Brault, M. W. (2013). *Disability characteristics of income-based government assistance recipients in the United States: 2011*. Washington, DC: US Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau. American Community Survey Briefs.
- Brucker, D. L. (2016). Food security among young adults with disabilities in the United States: Findings from the National health interview survey. *Disability and Health Journal*, 9(2), 298–305. <https://doi.org/10.1016/j.dhjo.2015.10.003>.
- Brucker, D. L., & Coleman-Jensen, A. (2017). Food insecurity across the adult life span for persons with disabilities. *Journal of Disability Policy Studies*, 28(2), 109–118.
- Buchmueller, T. C., Levinson, Z. M., Levy, H. G., & Wolfe, B. L. (2016). Effect of the affordable care Act on racial and ethnic disparities in health insurance coverage. *American Journal of Public Health*, 106(8), 1416–1421.
- Buchmueller, T. C., Lo Sasso, A. T., Lurie, L., & Dolfin, S. (2007). Immigrants and employer-sponsored health insurance. *Journal of Health Services Research*, 42(1p1), 286–310.
- Burwell, B. O., Preston, B., & Bailey, S. (1990). *Federal programs for persons with disabilities*. Washington, DC: Mathematica Policy Research, Inc.
- Bustamante, A. V., & Chen, J. (2012). Health expenditure dynamics and years of U.S. Residence: Analyzing spending disparities among Latinos by citizenship/nativity status. *Health Services Research*, 47(2), 794–818. <https://doi.org/10.1111/j.1475-6773.2011.01278.x>.
- Chávez, N., Telleen, S., & Young, O. R. K. (2007). Food insufficiency in urban Latino families. *Journal of Immigrant and Minority Health*, 9(3), 197–204.
- Chilton, M., Black, M., Berkowitz, C., & Casey, P. (2008). Food insecurity and risk of poor health among US-born children of immigrants. *American Journal of Public Health*, 99(3), 556–562.
- Chiswick, B. R., Cohen, Y., & Zach, T. (1997). The labor market status of immigrants: Effects of the unemployment rate at arrival and duration of residence. *Industrial and Labor Relations Review*, 50(2), 289–303.
- Cho, Y., Parker Frisbie, W., Hummer, R. A., & Rogers, R. G. (2004). Nativity, duration of residence, and the health of hispanic adults in the United States. *International Migration Review*, 38(1), 184–211.
- Coleman-Jensen, A., & Nord, M. (2013). *Food insecurity among households with working-age adults with disabilities*. USDA.
- Coleman-Jensen, A., Rabbitt, M. P., Gregory, C. A., & Singh, A. (2018). *Household food security in the United States in 2018, ERR-256*. US Department of Agriculture, Economic Research Service.
- ConAgra Foods Foundation. (2016). Food insecurity among immigrants, Refugees, and Asylees. Food Insecurity & Hunger in the U.S. http://org2.salsalabs.com/o/5118/p/salsa/web/common/public/content?content_item_KEY=13089
- Crowson, M. G., Schulz, K., & Tucci, D. L. (2016). Access to health care and hearing evaluation in US adults. *Annals of Otolaryngology, Rhinology & Laryngology*, 125(9), 716–721.
- Deroose, K. P., Bahney, B. W., Lurie, N., & Escarce, J. J. (2009). Review: Immigrants and health care access, quality, and cost. *Medical Care Research and Review*, 66(4), 355–408.
- Deroose, K. P., Escarce, J. J., & Lurie, N. (2007). Immigrants and health care: Sources of vulnerability. *Health Affairs*, 26(5), 1258–1268.
- Dong, X., & Platner, J. W. (2004). Occupational fatalities of hispanic construction workers from 1992 to 2000. *American Journal of Industrial Medicine*, 45(1), 45–54.
- Drew, J. A. R. (2015). Disability, poverty, and material hardship since the passage of the ada. *Disability Studies Quarterly*, 35(3), 4947. <https://doi.org/10.18061/dsq.v35i3.4947>.
- Durden, T. E., & Dean, L. G. (2013). Health insurance coverage of hispanic adults: An assessment of subgroup difference and the impact of immigration. *The Social Science Journal*, 50(4), 658–664.
- Emmett, S. D., & Francis, H. W. (2015). The socioeconomic impact of hearing loss in US adults. *Otology & Neurotology*, 36(3), 545.
- Engelman, M., Kestenbaum, B. M., Zuelsdorff, M. L., Mehta, N. K., & Lauderdale, D. S. (2017). Work disability among native-born and foreign-born Americans: On origins, health, and social safety nets. *Demography*, 54(6), 2273–2300.
- Garcia, M. A., Downer, B., Crowe, M., & Markides, K. S. (2017). Aging and disability among Hispanics in the United States: Current knowledge and future directions. *Innovation in Aging*, 1(2). <https://doi.org/10.1093/geroni/igx020>.
- Hadley, J. (2003). Sicker and poorer—the consequences of being uninsured: A review of the research on the relationship between health insurance, medical care use, health, work, and income. *Medical Care Research and Review*, 60(2 suppl), 35–75S.
- Hayward, M. D., Hummer, R. A., Chiu, C.-T., González-González, C., & Wong, R. (2014). Does the hispanic paradox in U.S. Adult mortality extend to disability? *Population Research and Policy Review*, 33(1), 81–96. <https://doi.org/10.1007/s11113-013-9312-7>.
- Heflin, C. (2017). The role of social positioning in observed patterns of material hardship: New evidence from the 2008 survey of income and program participation. *Social Problems* (spw041).
- Heflin, C. M., Altman, C. E., & Rodriguez, L. L. (2018). Food insecurity and disability in the United States. *Disability and Health Journal*, 12, 220–226.
- Hoffman, C., Schoen, C., Rowland, D., & Davis, K. (2001). Gaps in health coverage among working-age Americans and the consequences. *Journal of Health Care for the Poor and Underserved*, 12(3), 272–289.
- Houtenville, A. J., & Brucker, D. L. (2014). Participation in safety-net programs and the utilization of employment services among working-age persons with disabilities. *Journal of Disability Policy Studies*, 25(2), 91–105.
- Jiménez, T. R. (2008). Mexican immigrant replenishment and the continuing significance of ethnicity and Race1. *American Journal of Sociology*, 113(6), 1527–1567.
- Kaushal, N., Waldfogel, J., & Wight, V. (2014). Food insecurity and snap participation in Mexican immigrant families: The impact of the outreach initiative. *The B.E. Journal of Economic Analysis & Policy*, 14(1), 203–240. <https://doi.org/10.1515/bejeap-2013-0083>.
- Kennedy, S., McDonald, J. T., & Biddle, N. (2006). *The healthy immigrant effect and immigrant selection: Evidence from four countries*. SEDAP Research Program.
- Ku, L., & Bruen, B. (2013). "The use of public assistance benefits by citizens and non-citizen immigrants in the United States." Washington, DC.
- Leclerc, F. B., Jensen, L., & Biddlecom, A. E. (1994). Health care utilization, family context, and adaptation among immigrants to the United States. *Journal of Health and Social Behavior*, 35(4), 370.
- Maynard, M., Dean, J., Rodriguez, P. L., Sriranganathan, G., Qutub, M., & Kirkpatrick, S. I. (2018). The experience of food insecurity among immigrants: A scoping review. *Journal of International Migration and Integration*, 1–43.
- McCauley, L. A. (2005). Immigrant workers in the United States: Recent trends, vulnerable populations, and challenges for occupational health. *AAOHN Journal*, 53(7), 313–319.
- McHugh, M. (2018). *In the age of trump: Populist backlash and progressive resistance create divergent state immigrant integration contexts*. Washington, DC: Migration Policy Institute.
- Mitra, S., Palmer, M., Kim, H., Mont, D., & Groce, N. (2017). Extra costs of living with a disability: A review and agenda for research. *Disability and Health Journal*, 10(4), 475–484.
- Myers, A. M. C., & Painter, M. A. (2017). Food insecurity in the United States of America: An examination of race/ethnicity and nativity. *Food Security*, 9(6), 1419–1432.
- Nagi, S. Z. (1976). "An epidemiology of disability among adults in the United States." The Milbank Memorial Fund quarterly. *Health and Society*, 54, 439–467.

- Ortega, A. N., Hai Fang, Perez, V. H., Rizzo, J. A., Carter-Pokras, O., Wallace, S. P., et al. (2007). Health care access, use of services, and experiences among undocumented Mexicans and other Latinos. *Archives of Internal Medicine*, 167(21), 2354.
- Painter, M. A., & Qian, Z. (2016). Wealth inequality among immigrants: Consistent racial/ethnic inequality in the United States. *Population Research and Policy Review*, 35(2), 147–175. <https://doi.org/10.1007/s11113-016-9385-1>.
- Passel, J. S., & Cohn, D. Vera (2016). Overall number of U.S. Unauthorized immigrants holds steady since 2009. Washington, DC: Pew Hispanic Center. men <http://www.pewhispanic.org/2016/09/20/overall-number-of-u-s-unauthorized-immigrants-holds-steady-since-2009/>.
- Pichora-Fuller, M. K., Paul, M., & Reed, M. (2015). Hearing, cognition, and healthy aging: Social and public health implications of the links between age-related declines in hearing and cognition. In *Seminars in hearing* (Vol. 36, pp. 122–139). Thieme Medical Publishers.
- Ponce, N. A., Cochran, S. D., Mays, V. M., Chia, J., & Richard Brown, E. (2008). Health coverage of low-income citizen and noncitizen wage earners: Sources and disparities. *Journal of Immigrant and Minority Health*, 10(2), 167–176.
- Pransky, G., Moshenberg, D., Benjamin, K., Portillo, S., Lee Thackrey, J., & Hill-Fotouhi, C. (2002). Occupational risks and injuries in non-agricultural immigrant Latino workers. *American Journal of Industrial Medicine*, 42(2), 117–123.
- Pumkam, C., Probst, J. C., Bennett, K. J., Hardin, J., & Xirasagar, S. (2013). Health care expenditures among working-age adults with physical disabilities: Variations by disability spans. *Disability & Health Journal*, 6(4), 287–296.
- Quandt, S. A., Shoaf, J. I., Tapia, J., Hernández-Pelletier, M., Clark, H. M., & Arcury, T. A. (2006). Experiences of Latino immigrant families in North Carolina help explain elevated levels of food insecurity and hunger. *Journal of Nutrition*, 136(10), 2638–2644. <https://doi.org/10.1093/jn/136.10.2638>.
- Rabbitt, M. P., Smith, M. D., & Coleman-Jensen, A. (2016). *Food security among hispanic adults in the United States, 2011-2014, ERS 153*. United States Department of Agriculture, Economic Research Service.
- Ruffing, K. (2015). *Geographic pattern of disability receipt largely reflects economic and demographic factors*. Washington, DC: Center on Budget Policy Priorities. <http://www.cbpp.org/sites/default/files/atoms/files/1-8-15ss.pdf>.
- Schneider, J., Gopinath, B., Karpa, M. J., McMahon, C. M., Rochtchina, E., Leeder, S. R., et al. (2010). Hearing loss impacts on the use of community and informal supports. *Age and Ageing*, 39(4), 458–464.
- Schoen, C., & DesRoches, C. (2000). Uninsured and unstably insured: The importance of continuous insurance coverage. *Health Services Research*, 35(1 Pt 2), 187.
- She, P., & Livermore, G. A. (2007). Material hardship, poverty, and disability among working-age adults. *Social Science Quarterly*, 88(4), 970–989.
- Sonik, R., Parish, S. L., Ghosh, S., & Igdalsky, L. (2016). Food insecurity in U.S. households that include children with disabilities. *Exceptional Children*, 83(1), 42–57.
- Stimpson, J. P., Wilson, F. A., & Su, D. (2013). Unauthorized immigrants spend less than other immigrants and U.S. natives on health care. *Health Affairs*, 32(7), 1313–1318.
- Sudano, J., Jr., Joseph, J., & Baker, D. W. (2003). Intermittent lack of health insurance coverage and use of preventive services. *American Journal of Public Health*, 93(1), 130–137.
- Tarasuk, V., Mitchell, A., McLaren, L., & McIntyre, L. (2013). Chronic physical and mental health conditions among adults may increase vulnerability to household food insecurity. *Journal of Nutrition*, 143(11), 1785–1793. <https://doi.org/10.3945/jn.113.178483>.
- Tarraf, W., Mahmoudi, E., Dillaway, H. E., & González, H. M. (2016). Health spending among working-age immigrants with disabilities compared to those born in the U.S. *Disability and Health Journal*, 9(3), 479–490. <https://doi.org/10.1016/j.dhjo.2016.01.007>.
- The Pew Charitable Trusts. (2014). Mapping public benefits for immigrants in the States." Vol. Issue brief. <https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2014/09/mapping-public-benefits-for-immigrants-in-the-states>.
- Toussaint-Comeau, M. (2006). The occupational assimilation of hispanic immigrants in the U.S: Evidence from panel data. *International Migration Review*, 40(3), 508–536.
- U.S. Centers for Medicare & Medicaid Services. (2016). "Coverage for lawfully present immigrants" *immigrants*. <https://www.healthcare.gov/immigrants/lawfully-present-immigrants/>.
- U.S. Citizenship and Immigration Services. (2019). *Citizenship through naturalization*. U.S. Citizenship. <https://www.uscis.gov/us-citizenship/citizenship-through-naturalization>.
- USDA Food and Nutrition Service. (2013). Supplemental nutrition assistance program (Snap): Snap policy on non-citizen eligibility. <https://www.fns.usda.gov/snap/eligibility/citizen/non-citizen-policy>.
- Verbrugge, L. M., & Jette, A. M. (1994). The disablement process. *Social Science & Medicine*, 38(1), 1–14.
- Waldinger, & Roger, D. (1997). *Social capital or social closure? Immigrant networks in the labor market*. UCLA School of Public Policy and Social Research.
- Wallace, S. P., Torres, J., Sadegh-Nobari, T., & Pourat, N. (2013). *Undocumented and uninsured: Barriers to affordable care for immigrant population*. Los Angeles, CA: The Commonwealth Fund and the UCLA Center for Health Policy Research.
- Wallhagen, M. I., Strawbridge, W. J., Shema, S. J., Kurata, J., & Kaplan, G. A. (2001). Comparative impact of hearing and vision impairment on subsequent functioning. *Journal of the American Geriatrics Society*, 49(8), 1086–1092.
- Wolfe, W. S., Frongillo, E. A., Jr., & Pascale Valois. (2003). Understanding the experience of food insecurity by elders suggests ways to improve its measurement. *Journal of Nutrition*, 133(9), 2762–2769.
- Yang, P. Q., & Hwang, S. H. (2016). Explaining immigrant health service utilization: A theoretical framework. *SAGE Open*, 6(2). <https://doi.org/10.1177/2158244016648137>.