Food Insecurity, Chronic Disease and Quality of Life among Deaf Adults who use American Sign Language

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Abstract

This study examined the relationships of food insecurity, chronic diseases, and QoL in a U.S. sample of 630 deaf adults (18 to 89 years old; 55% female) who used American Sign Language (ASL). Measures of USDA Food Security Module, self-reported diagnoses of chronic diseases, and QoL were administered in ASL and English. Approximately 22% reported facing food insecurity, with low food security (11%) and very low food security (11.4%). QoL, but not the presence of chronic diseases, was significantly associated with food insecurity. Higher income and absence of depression acted as protective factors, reducing the risk for food insecurity.

Keywords

Food security; Deaf; Sign language; Chronic disease; quality of life; disability; deafness

Introduction

To date, the prevalence, causes and implications of food insecurity and its relationship to chronic diseases and quality of life (QoL) among the estimated 500,000 deaf individuals who use American Sign Language (ASL) has not been sufficiently researched despite a robust literature about food insecurity in diverse populations including race, ethnicity, socioeconomic status and disability.[1–3] Since 2008, the United States has witnessed a surge in food insecurity and poverty levels.[4] According to the USDA,[5] an estimated 12.7% of US households were food insecure. In addition, the U.S. also faces a significant burden of preventable morbidity and mortality due to chronic diseases, despite the fact 84 percent of all U.S. health spending is on chronic diseases.[6] In order to mitigate food insecurity in the deaf population, it is imperative to critically examine the scope of the problem and its relationship to QoL and chronic disease risk.

Given the link between chronic disease and food insecurity,[6,7] deaf people who use ASL primarily are potentially at a higher risk for mismanagement of existing chronic diseases due

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to a number of factors. These factors can include a lack of awareness of an increased risk for chronic diseases such as cardiovascular diseases,[8] a lack of preventative screening as a result of ineffective doctor-patient communication,[9] low health literacy,[10] and a lack of interpreters or uncertified interpreters in health care settings.[9] Building interventions to reduce chronic disease in the deaf population requires an evidence base.[11]

Food Insecurity and Chronic Disease Risk in Deaf Adults

In a nationwide study of 475 deaf adult respondents, 8% reported *often* experiencing difficulties with making food last based on a single screener from U.S. Household Food Security Survey screening, "The food that I bought just didn't last, and I didn't have money to get more. Was that often, sometimes, or never true for (you/your household) in the last 12 months?"[12] In this same study, deaf respondents who retrospectively reported greater difficulties with understanding what their parents said while growing up had higher odds of experiencing difficulties with making their food last or did not have money to get more food compared to deaf respondents who were able to communicate with their caregivers. In another study of college-aged deaf students, self-reported difficulties with understanding one-on-one communication with parents during their teen years was linked to greater depressive symptomatology,[13] which can have an unintended domino effect on health-related outcomes as was the case for food insecurity.

In a national sample of deaf people aged 20 to 69, secondary data from the 1999–2004 National Health and Nutrition Examination Survey (NHANES) indicated higher cardiovascular risk and diabetes among respondents with worse hearing levels compared to the general hearing population.[14] In a study of 267 deaf sign language-users in the UK,[15] 7% self- reported being diabetic, similar to the rate in the general population as measured by the 2011 English Health Survey. However, 8% of 249 deaf people who reported that they were not diabetic had elevated blood sugar levels. Among the 8% (n=20) with elevated blood sugar levels, a majority (77%; n=15) were not aware that they had this problem. Among eighteen deaf adults who reported that they were diabetic, five deaf adults (28%) demonstrated elevated blood sugar levels. Taken together, this suggests that pre-diabetic and diabetic deaf people who do not have access to health information are at risk for poorer health management.

Taren et al.[16] found that although low-income families had increased access to food programs, servings of food tended to decrease at the end of the month. According to Gerber,[17] people with disabilities faced additional nutrition-access barriers that went beyond financial constraints. These circumstances may place deaf ASL users with chronic conditions at an increased risk for obesity and inadequate nutrition.

Food Insecurity, Disability, Mental Health, and Quality of Life

According to an USDA report, the connection between disability, poverty, and food insecurity indicate that being disabled increases the likelihood of being in poverty, which in turn increases the risk for food insecurity.[18,19] In addition, people with disabilities have higher expenses related to healthcare.[20,21] Higher out of pocket medical expenditures are associated with a higher probability of food insecurity.[22] Brucker et al.[23] found that adults

with disabilities have higher odds of experiencing food insecurity compared to non-disabled adults. This study also showed that working-age disabled adults (ages 25 to 61 years old) experienced the highest level of food insecurity compared to non-working disabled adults. Some of the differences may be attributed to income-related disparity among working-age disabled adults and the availability of government support such as Supplemental Security Income and Social Security for non-working adults with disabilities.

There are significant health implications of food insecurity, including hypertension, hyperlipidemia and cardiovascular risk factors in adults.[24] According to Casey et al.,[25] household food insecurity was significantly associated with a lower health-related QoL, after adjustment for age, ethnicity, gender, and family income. Respondents in food insufficient households were more likely to report fair or poor functional health, including major depression, and were less likely to have social support.[26] Studies indicate that food insecurity is linked to increased likelihood of a major depressive episode or generalized anxiety disorder, after adjusting for sociodemographic factors, drug use, domestic violence, and physical health. [27, 28] The current study investigated the prevalence and relationship of food security with self-reported chronic medical conditions and quality of life outcome in a U.S. sample of deaf adults who use ASL.

Methods

A health questionnaire was administered to an U.S. sample of deaf adults from February to May 2017. Items related to sociodemographics (e.g. age, income, education, gender, race), food security status, QoL, and chronic disease were used for the current study. All items were forward and back translated by bilingual users of ASL and English, tested in cognitive interviews, and then finalized in an online ASL/English survey prior to survey administration.

Food security status.

The survey included six-item short form of the U.S. Household Food Security Survey Module that was validated on a national adult sample and widely used in many studies.[29] This has been found to have adequate specificity and is effective at distinguishing those who are food secure and those who are food insecure. Food security status is assigned based on raw scores of 0–1 (high food security), 2–4 (low food security), and 5–6 (very low food security).

Sociodemographic Variables, Quality of Life, and Chronic Diseases:

Sociodemographic data included age, gender, education, sexual orientation, and income. Quality of life was assessed with "*In general, how would you rate your quality of life*? (Poor to Excellent). Chronic diseases were self-reported medical diagnoses that the respondents provided. Diagnoses included depression or anxiety disorder, cancer, diabetes, hypertension, heart diseases, lung diseases/asthma, arthritis, and liver/kidney problems. The severity of comorbid chronic diseases was scored using the Charlson Comorbidity Index (CCI). [30]

Participant Recruitment, Consenting and Other Study Procedures

Following IRB approval by the institution's human subjects review board, the research staff began recruitment through national channels, focusing on ASL-using Deaf community members. Given the nature of this low-incidence and hard-to-reach population, respondent-driven sampling method was used to ensure adequate inclusion of diverse deaf signers across the USA, including Hawaii and Alaska. Recruitment methods included snowball sampling through personal networks,[31] flyers, and advertisements on deaf-centered organizations' websites and e-newsletters. Communication occurred through accessible channels, including mail, email, social media, and videochat programs. We included only those who self-reported using ASL as their primary language and excluded those under the age of 18 years old as well as those who had unilateral hearing loss. Each participant received a $25 gift card as a gratuity.

If the participant met with research staff remotely, ASL instructions were given through a videoconferencing method and a link to the online survey in ASL was emailed to the participant. Research staff remained visible to the participant through videoconferencing and was readily available to answer questions or troubleshoot as the participant progressed through the consent document and survey. For on-site administration, participants were given access to iPads or computers with pre-loaded survey in ASL. If the participant preferred live administration instead of watching the ASL question as signed on a pre-recorded video, research staff accommodated this preference. For some participants such as those with low vision or who did not feel comfortable with self-administration on a computer, research staff signed all the questions and response options and recorded the participants' responses on the computer. The survey took approximately 1 hour to complete. No names or identifying information were included in the online survey, and a unique identifier was used to avoid storing personal information in the same online survey dataset. The identifying information was stored in a separate database that was accessible only to the principal investigator.

Statistical analyses

Cross-tabulation and percentage procedures were used to summarize the sample characteristics. Chi-square tests were used to describe the relationships among the variables. Given the binary nature of the food security outcome (food secure vs food insecure), binomial regression analysis was used to regress CCI and QoL on food security, after controlling for sociodemographic variables and self-reported depression/anxiety disorder diagnosis. The SPSS 25.0 was used for all analyses.

Results

A total of 636 deaf adults took the survey that included the 6-item food security questions. Six people did not answer questions about medical conditions and/or QoL. Since the binomial logistic regression model included chronic diseases (CCI) and QoL as predictors, responses to these questions were also required. Thus, our study sample was further reduced to 630 people who responded to all sociodemographics (see Table 1), medical condition, QoL, and food security questions. Within this sample, 11% were at identified as having low

food security (scores of 2–4 on the Food Security Module) and an additional 11% were already experiencing very low food security (scores of 5–6).

According to Table 1, food security groups differed significantly across all sociodemographic characteristics, except for BMI. Food insecurity was greatest among students and individuals in the low-income category. Those who were single or self-identified as nonbinary/genderqueer or LGBQA experienced food insecurity more often compared to those who were in a relationship or self-identified as straight. Racial/ethnic minority groups had more individuals who experienced food insecurity compared to non-Hispanic White individuals.

Table 2 lists results from a binomial logistic regression that was used to assess the probability of a deaf adult with chronic comorbidity and perceived QoL to experience food insecurity. After controlling for covariates, the number or severity of chronic diseases was not associated with food security status. However, QoL was significantly associated with the food security outcome. Deaf adults who perceived their QoL to be fair or poor had a 6-fold increase in experiencing food insecurity compared to deaf adults who perceived their QoL to be excellent. Deaf adults who perceived their QoL to be good had a 3-fold increase in experiencing food insecurity compared to deaf adults who perceived their QoL to be excellent. As expected, having higher income emerged as a protective factor for food insecurity. Additionally, our results showed that those who were either younger or self-identified as LGBQA were at higher risk for food insecurity. Race/ethnicity did not contribute to the model in our sample due to a small sample size.

Discussion

According to responses from our U.S. sample of deaf ASL users, low perceived QoL has a significant, positive relationship with food insecurity, after controlling for sociodemographics, depression/anxiety diagnosis, and chronic conditions. Given the relationship between QoL and food insecurity in our sample, it is important to support evidence-based clinical and governmental interventions targeting at-risk populations. Kim et al.[32] found that food insecure elders who participated in food assistance programs were less likely to be overweight and depressed. Ensuring that food insecure deaf individuals have access to information about food assistance programs may decrease the likelihood of depression and obesity.

A higher income in our sample reflected a higher likelihood of food security, consistent with the research literature. Given the low employment rates faced by deaf Americans, employment initiatives along with more recognition by employers of the myriad benefits of hiring deaf Americans could also increase food security among deaf Americans who report a low QoL.

In our deaf sample, those who self-identified as LGBQA were more likely to report greater food insecurity than those who were straight or heterosexual. Consistent with the data from the 2014 Supplemental Nutrition Assistance Program (SNAP) [33], deaf LGBQA adults are nearly twice as likely than deaf non-LGBQA adults to not have had enough money to feed

themselves or their family in the past year. The medical profession can incorporate a screening for structural vulnerabilities when interfacing with food-insecure deaf patients from minority populations. In addition, providing quality nutrition education that takes financial insecurity into account can allow and empower low-income food insecure deaf individuals to manage their health. Patient or client counseling about quality nutrition education can take place in the doctor's office, at deaf community centers, and community-based organizations that serve the deaf community. Structural interventions that target food deserts and access to affordable, healthy food can also play a role in improving food security, particularly for deaf people living in rural areas or in urban food deserts.

A major strength of this study is that it utilizes the largest U.S. sample of deaf adults to date regarding food security, chronic diseases, and QoL. The breadth of demographic information collected further strengthens this study. A limitation is that our study did not analyze food security and chronic disease in relation to race due to insufficient number of responses when broken down by chronic disease type, ethnic/racial group, and food security status, which could have provided further research insight.

Conclusion

Low perceived QoL is significantly associated with food security status, after controlling for sociodemographics, depression, and chronic conditions. In order to ameliorate food insecurity in the deaf population, this critical analysis of the link between QoL and food insecurity will enable medical professionals, social service providers, food banks, nutrition educators, and school meal assistance programs to tailor their services to consider the needs of deaf food insecure individuals. We recommend that providers (e.g. physicians, social workers, counselors) who encounter deaf patients or clients include disability-related and QoL screening questions in order to identify and target populations at particular risk for food insecurity and to provide referrals and appropriate resources.

The rate of food insecurity in the United States went up significantly during the recession (2007–2009). While it has declined since then, it is currently higher than it was prior to the recession. [34] It is imperative that public health practitioners, policy makers, and the medical profession take into consideration the needs of food insecure people with disabilities and other marginalized populations. The prevalence of food insecurity among the deaf population in the U.S. is a call to action for medical and public health professionals and policy makers to include people with disabilities, including the deaf, in national conversations addressing the root causes of increasing food insecurity in the U.S.

Acknowledgments

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Table 1:

Sociodemographic characteristics by Food Security Status (N=630)

	Food secure (n=489)	Low food security (n=69)	Very low food security (n=72)	
				F-test (p-value)
Age in years (mean, SD):	46 (19)	37 (14)	38 (15)	**12.51 (.001)**
BMI (mean, SD):	28 (6)	28 (8)	28 (6)	.79 (.46)
				X^2 (p-value)
Gender	n (%)	n (%)	(%)	**11.95 (0.02)**
Female (%):	274 (56.0%)	35 (50.7%)	37 (51.4%)	
Male (%):	207 (42.3%)	32 (46.4%)	29 (40.3%)	
Non-binary/genderqueer (%):	8 (1.6%)	2 (2.9%)	6 (8.3%)	
Race/Ethnicity				**21.30 (<.01)**
Non-Hispanic White (%):	361 (73.8%)	38 (55.1%)	46 (63.9%)	
Non-Hispanic Black (%):	39 (8.0%)	10 (14.5%)	8 (11.1%)	
Non-Hispanic Asian (%):	23 (4.7%)	2 (2.9%)	1 (1.4%)	
Hispanic (%):	51 (10.4%)	12 (17.4%)	13 (18.1%)	
Other (%):	15 (3.1%)	7 (10.1%)	4 (5.6%)	
Education				**14.09 (<.01)**
HS or less (%):	99 (20.2%)	11 (15.9%)	20 (27.8%)	
Some college (%):	112 (22.9%)	10 (14.5%)	24 (33.3%)	
College degree (%):	278 (56.9%)	48 (69.6%)	28 (38.9%)	
Occupation				**42.38 (<.001)**
Employed (%):	256 (52.4%)	47 (68.1%)	31 (43.1%)	
Unemployed (%):	34 (7.0%)	4 (5.8%)	8 (11.1%)	
Homemaker (%):	11 (2.2%)	1 (1.4%)	5 (6.9%)	
Student (%):	68 (13.9%)	10 (14.5%)	20 (27.8%)	
Retired (%):	115 (23.5%)	4 (5.8%)	5 (6.9%)	
Disabled (%):	5 (1.0%)	3 (4.3%)	3 (4.2%)	
Income				**46.96 (<.001)**
Low Income (%):	172 (35.2%)	41 (59.4%)	51 (70.8%)	
Middle Income (%):	239 (48.9%)	25 (36.2%)	20 (27.8%)	
Upper Income (%):	78 (16.0%)	3 (4.3%)	1 (1.4%)	
Martial status				**11.00 (<.01)**
Single (%):	271 (55.4%)	50 (72.5%)	50 (69.4%)	
Partnership (%):	218 (44.6%)	19 (27.5%)	22 (30.6%)	
Sexual Orientation				**13.11 (<.01)**
Straight (%):	337 (68.9%)	37 (53.6%)	37 (51.4%)	
LGBQA[a] (%):	152 (31.1%)	32 (46.4%)	35 (48.6%)	

[a]Lesbian, gay, bisexual, queer, asexual

Table 2.

Binomial Logistic Regression for Food Security Status (N=630)

Variable		Log Reg Adj OR	95% CI for Log Reg (Lower)	95% CI for Log Reg (Upper)
Age		0.98**	0.96	0.99
Race/Ethnicity				
	Non-white	1.33	0.85	2.07
	White	ref		
Income				
	Lower	7.41***	2.53	21.73
	Middle	3.03*	1.03	8.92
	Upper	ref		
Partnership				
	Single	1.00	0.63	1.58
	In partnership	ref		
Sexual Orientation				
	LGBQA	1.67*	1.08	2.59
	Straight/heterosexual	ref		
Depression Diagnosis				
	Present	1.19	0.74	1.90
	Absent	ref		
Chronic Disease Comorbidity		1.09	0.86	1.38
Quality of Life				
	Poor/Fair	6.01***	2.47	14.51
	Good	3.09**	1.48	6.46
	Very good	1.72	0.82	3.62
	Excellent	ref		

*
p<.05

**
p<.01

***
p<.001