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Food Insecurity Among Deaf and Hard of Hearing: A Scoping Review

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Abstract

We employed a scoping review to examine peer-reviewed journal articles published between 2017 and 2021 on the relationship between food insecurity among deaf and hard-of-hearing (DHOH) populations and language barriers for American Sign Language (ASL). Four databases yielded 259 peer-reviewed articles during the initial search. Four peer-reviewed articles were included in this review to explore the relationship between food insecurity among DHOH populations and language barriers for ASL. Multiple contributing factors create a food-insecure individual. Results indicate that income level, mental health status, and caregiver communication are all predictors of food insecurity for DHOH. None of the contributing factors have a greater impact than the others. Further research is needed to examine the relationships between these predictors.

Keywords

Food insecurity, food security, deaf and hard-of-hearing (DHOH), American Sign Language (ASL), communication

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Disclosure statement

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Food Insecurity Among Deaf and Hard of Hearing: A Scoping Review

Introduction

Food security means having access to enough food to help maintain an active, healthy lifestyle (Coleman-Jensen et al., 2011; Schwartz et al., 2019), while *food insecurity* is not having access to food, in part owing to financial constraints (Gundersen & Ziliak, 2018; Schwartz et al., 2020; Tarasuk et al., 2019). One study estimated that 12.7% of American families were food-insecure at some point in 2015 (Coleman-Jensen et al., 2011). Disability has emerged as one of the strongest factors affecting a household's food security. Generally, individuals with disabilities have lower access to healthcare and tend to experience poorer health outcomes (World Health Organization [WHO], 2021). Moreover, research in the United States and Canada indicates that persons with disabilities experience a greater risk of food insecurity than persons without disabilities (Gundersen & Ziliak, 2018; Schwartz et al., 2020; Tarasuk et al., 2019). Negative health effects result not only from poor diets and nutrition but also stress and lack of control over basic needs (Schwartz et al., 2020; Tarasuk, 2017). Explanations for the disability–food insecurity link include reduced financial resources and high household expenses related to the disability, such as equipment, care, and medical needs (Schwartz et al., 2020).

In the United States, the deaf and hard-of-hearing (DHOH) population is a prominent vulnerable group. Recent estimates conclude that 1 in 20 people is considered part of this population, whether they have full or partial hearing loss (WHO, 2021). According to the U.S. Social Security Administration (2021), a hearing loss of 60% or more is a medical disability. Many factors categorize DHOH people as a vulnerable group, including communication barriers, education, and low-income levels. As a vulnerable group, DHOH groups are predisposed to food insecurity and subsequent nutritional deficiencies.

Food Insecurity

Gundersen & Ziliak (2018), Schwartz et al. (2020) and Tarasuk et al. (2019) define *food insecurity* as not having access to food, in part owing to financial constraints which includes trouble accessing, purchasing, and preparing healthy and sustainable food depending on an individual's nutritional needs. Unfortunately, it is commonplace for DHOH individuals to be food insecure and have low health literacy levels (Kushalnagar et al., 2018b). Health literacy refers to an individual's ability to access and understand information related to health and consequently make informed health decisions (United States Department of Health and Human Services Office of Disease Prevention and Health Promotion, 2023). A DHOH person's communication style and background depend on when and how that individual acquired their hearing loss. For example, someone born deaf, who learned American Sign Language (ASL) throughout their childhood, and who communicates primarily through ASL might have a different communication style than someone who acquired a hearing loss after birth and communicates primarily through lip-reading and spoken communication. This scoping review focuses on people who communicate partially or entirely through ASL.

How people communicate significantly impacts the knowledge they learn throughout their lives. If there are barriers to understanding, gaps in knowledge may exist. If individuals speak a

different language than their caregivers growing up and their close contacts throughout life, they may be predisposed to difficulties in their health and wellness. Generally, parents and caregivers positively contribute to a DHOH adult's employment rates and independence levels by being actively involved in the DHOH adult's childhood (Kushalnagar et al., 2018).

The DHOH community's primary form of communication is through ASL or interpretation through body language and lip-reading. Without family members understanding or being fluent in ASL, DHOH individuals are predisposed to comprehension difficulties (Kushalnagar et al., 2018).

Regarding health literacy, the intricate nature of subject materials can be further misconstrued or poorly communicated if they are not properly translated through ASL. Reduced access to incidental information—for example, overhearing a conversation—may also lead to decreased levels of comprehension. This can be due to a need for more background knowledge on health and nutrition subjects to interpret information accurately (Kushalnagar et al., 2018).

Purpose

This scoping review aimed to establish the current state of knowledge on the relationship between food insecurity among DHOH populations and language barriers for ASL. The questions giving specific direction to the review were as follows:

1. What is the nature of academic literature at the intersection of food insecurity, DHOH, and health communication practice?
2. Which researchers are currently engaged in research related to the DHOH, food insecurity, and ASL as a mode of communication in their research?

Methods

Knowledge synthesis has grown exponentially in the past decade to become an established methodology in health research to support evidence-informed practice and better health outcomes (Schick-Makaroff et al., 2016). Moreover, literature studies can be methodologically designed in a variety of ways. Although there are several definitions of a scoping review, the methodology is well described, including formulating a straightforward research question, explicit inclusion and exclusion criteria, defined procedures, and division of responsibilities and work among the researchers (Peterson et al., 2017). This scoping review of the literature was informed by the framework outlined by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews (Tricco et al., 2018). We utilized the five steps of Arksey and O'Malley's (2005) framework to complete this review:

1. identifying the research question,
2. identifying relevant studies,
3. study selection,
4. charting the data, and
5. collating, summarizing, and reporting the results.

Scoping reviews are used when relatively little is known about an area of knowledge; they can be a precursor to inform and scope the parameters for a systematic review; [or] map out the literature in a research area and identify gaps in the existing knowledge base (Bassett & McGibbon, 2013, p. 3250).

Identifying the Research Question

Per Arksey and O'Malley's (2005) first step, a research question was formulated to address the overall aim, which was to identify studies addressing language barriers experienced by DHOH individuals as it relates to food insecurity. We developed the research question following population, concept, and context (Peters et al., 2015). We explored the relationship between language barriers using ASL and food insecurity among DHOH populations. When considering methods for investigating food insecurity of DHOH individuals who use ASL, a scoping review was conducted to compile all current research. Due to this topic's narrow scope, a scoping review is most appropriate in compiling knowledge to identify research gaps, provide avenues for further research, and supply a broader context on individuals with disabilities related to food insecurity.

Identifying Relevant Studies

One Grand Valley State University librarian was contacted to identify the applicable databases. The librarian conducted an initial search in various databases, and the following search terms were determined for the scoping review search: "food insecurity," "American Sign Language (ASL)," and "Deaf and Hard of Hearing (DHOH)."

Electronic Searches

A comprehensive search strategy was developed to identify relevant peer-reviewed articles through September 2021. The population selected was DHOH individuals. Four databases were used to collect relevant peer-reviewed articles: PubMed, Cumulative Index of Nursing and Allied Health Literature (CINAHL), Web of Science, and Social Science Full Text. The determined search words were applied to each database: "food insecurity," "American Sign Language (ASL)," and "Deaf and Hard of Hearing (DHOH)." Results were then filtered based on the year of publication (2017–2021), peer revision, location (within the United States), and full-text availability. The filters were specifically selected to generate the most relevant and up-to-date literature in a language we could read and understand. After screening the results based on the titles and abstracts, the full texts were read and screened using the same criteria; 253 peer-reviewed articles were excluded because they did not meet inclusion criteria. Government and nontraditional publications were excluded because the primary purpose of this scoping review is to identify and present how previous research from traditional literature and publication channels has studied food insecurity and language barriers. Inclusion criteria consisted of primary studies (published articles) that (a) were specific to food insecurity, (b) were specific to the DHOH population, (c) featured ASL as a mode of communication, and (d) were published in English. Figure 1 provides an example PubMed search query of keywords.

Figure 1*PubMed Search Query of Keywords*

Search: ((food insecurity) AND (American sign language)) AND (deaf AND hard of hearing)

("food insecurity"[MeSH Terms] OR ("food"[All Fields] AND "insecurity"[All Fields]) OR "food insecurity"[All Fields]) AND (("american"[All Fields] OR "american s"[All Fields] OR "americanization"[All Fields] OR "americanized"[All Fields] OR "americans"[All Fields]) AND ("sign language"[MeSH Terms] OR ("sign"[All Fields] AND "language"[All Fields]) OR "sign language"[All Fields])) AND (("persons with hearing impairments"[MeSH Terms] OR ("persons"[All Fields] AND "hearing"[All Fields] AND "impairments"[All Fields]) OR "persons with hearing impairments"[All Fields] OR "deaf"[All Fields]) AND ("hearing loss"[MeSH Terms] OR ("hearing"[All Fields] AND "loss"[All Fields]) OR "hearing loss"[All Fields] OR ("hard"[All Fields] AND "hearing"[All Fields]) OR "hard of hearing"[All Fields]))

Manual Searches

Manual searches were conducted with three prominent deafness-related academic journals: (a) *American Annals of the Deaf*, (b) *Deafness and Education International*, and (c) *Journal of Deaf Studies and Deaf*. The manual searches did not identify any additional peer-reviewed articles that met the inclusion criteria.

Study Selection

The study selection was completed in two stages: (a) title and abstract screening and (b) full-text review. Microsoft Excel was used to manage the study selection, and all duplicates were removed. We randomly divided all peer-reviewed articles between two reviewers (R. S. and L. J.) to independently screen the article titles and abstracts as well as independently screen the full-text against the inclusion criteria. We resolved discrepancies through discussion and consultation as needed to reach a consensus on the included documents.

Charting the data

An overview of the selected articles was compiled, including information on the author(s), year of publication, study location, title, study design, and study participants (including number). Table 1 (pages 49-50) provides a summary of the results extracted from each peer-reviewed article.

Results

In this section, we present the scoping review findings by mapping the shape of the field of existing knowledge and a synthesis of the knowledge. A total of 259 peer-reviewed articles were identified, 5 of which met inclusion criteria and were included in the review. A summary of the exclusions with the reasoning in the PRISMA diagram (Tricco et al., 2019) is in Figure 2.

Of the five articles included, four were peer-reviewed studies conducted in the United States and by the same author or set of authors (Engelman & Kushalnagar, 2021; Engelman et al., 2021; Kushalnagar et al., 2018a; Kushalnagar et al., 2018b). Three of the five peer-reviewed studies used a quantitative methodology (Engelman & Kushalnagar, 2021; Engelman et al., 2021; Kushalnagar et al., 2018a). The quantitative studies employed a cross-sectional survey design and used a variety of descriptive statistics (Engelman & Kushalnagar, 2021; Engelman et al., 2021; Kushalnagar et al., 2018a) as well as correlational analysis and regression analysis (Engelman et al., 2021). The search and selection process are represented in Figure 2 on the next page.

The five peer-reviewed studies included food insecurity, communication, and hearing loss measures. Three provided data from survey questions whose answers were re-coded and quantitatively measured through statistical analysis (Engelman et al., 2021; Engelman & Kushalnagar, 2021; Kushalnagar et al., 2018a). The fourth article was a qualitative study that investigated the relationship between critical health literacy and communication among Deaf students who use ASL (Kushalnagar et al., 2018b). The fifth included data from a scoping review on U.S. individuals with disabilities, including U.S. DHOH populations, related to their overall food access and insecurity (Schwartz et al., 2019) and, therefore, was included in this scoping review.

In the Kushalnagar et al. 2018a study, Deaf adult participants were sent a survey about food insecurity; the researchers based the results on the survey question: "The food I bought didn't last, and I did not have money to get more. Was that often, sometimes, or never true for (you/your household) in the last 12 months?" Respondents were asked to choose an answer based on a scale ranging from "don't know" to "often." Participants were also asked questions regarding their caregivers' communication related to whether they were proficient in ASL and if the DHOH individual effectively understood them. A multinomial regression was performed based on the survey results.

The methodology in the Engelman et al. 2021 study consisted of collecting survey data focused on food shortages, worries related to contracting coronavirus disease (COVID-19), isolation concerns associated with staying home, and the loneliness accompanying isolation. The results were compiled online. All survey questions were provided in English and translated via an ASL interpreter on a recorded video for participants to watch online while taking the survey. Questions were based on a qualitative scale of responses ranging from "not at all worried" to "very worried" for questions based on feelings related to contracting COVID-19 and "not true at all" to "very true" for questions related to feelings of loneliness because of complying with social distancing measures. After re-coding the questions, a logistic regression was completed and demographic variables such as race and ethnicity, sex, and gender were considered.

The Engelman & Kushalnagar 2021 study focused on food insecurity's relationship to chronic disease and quality of life (QoL) of DHOH individuals who communicate primarily through ASL. The 630 participants responded to questions related to food security status, sociodemographic variables, quality of life, and chronic disease status. Food security was assessed using raw U.S. household food security survey module scores. Scores based on this module were categorized into three qualitative categories: high food security, low food security, and very low food security. The sociodemographic data collected included age, gender, sexual orientation, and income. QoL was assessed by asking, "How would you rate your quality of life?" Respondents answered on a scale from "poor" to "excellent." Chronic disease prevalence was measured through participant self-disclosure of diagnosed conditions such as depression and anxiety, hypertension, and heart disease. Then, the severity of these diseases was scored using the Charlson Comorbidity Index (CCI). A Chi-Square test measured the relationship between variables, while binomial regression analysis was applied to the QoL and CCI data.

Kushalnagar et al. (2018b) aimed to explore the relationship between critical health literacy and health related conversations among Deaf undergraduate students who use ASL. Participants completed an online questionnaire that included questions related to their communication and health histories. The researchers also measured functional health literacy, interactive health literacy, and critical health literacy. Due to previous research, Kushalnagar et al. included the parent education variable as a covariate in their analyses. Functional health literacy was also included as a covariate in case it had any influence on interactive or critical health literacy. To test their hypothesis that friends impacted critical health literacy, linear and hierarchical regression models were used to identify significant predictors.

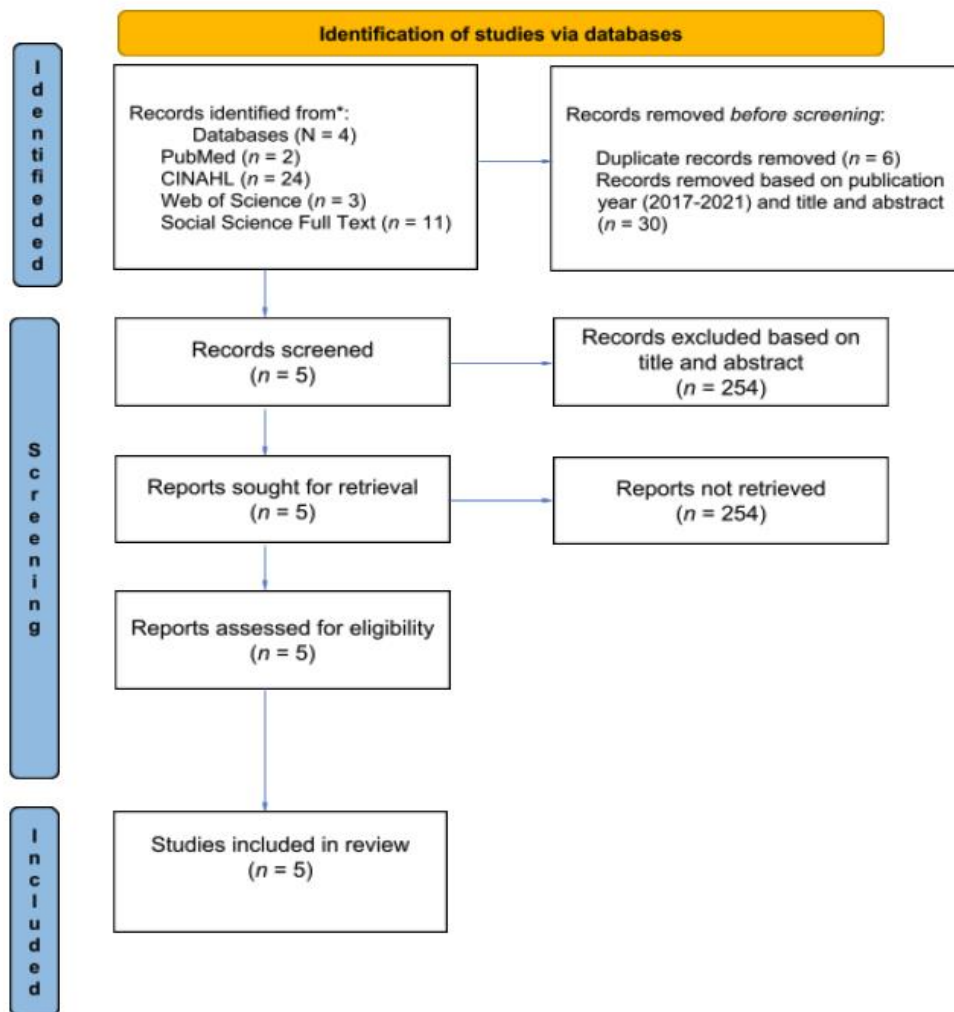
Schwartz et al. (2019) conducted a scoping review to examine the effect of disability on food (in)security. A socioecological model was used to assess the relationships between disability and food at varying levels. For the purpose of the study, disability broadly included sensory, mobility, mental, cognitive, and physical impairments. Excluded articles included those that focused solely on health status or older populations, institutionalized populations, or outcomes of nutritional behaviors. By the end of the search, 106 articles were included and came from a variety of academic fields and sources.

Food insecurity among DHOH populations

The five peer-reviewed articles provide evidence of food insecurity among the DHOH population. The results yielded influences or contributing factors on the overall problem of food insecurity at the individual, social, organizational, and environmental levels (Schwartz et al., 2019; Kushalnagar et al., 2018a; Kushalnagar et al., 2018b; Engelman et al., 2021; Engelman & Kushalnagar, 2021).

Figure 2.

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram for search and selection process.



Contributing factors for food insecurity at the individual level are socioeconomic status, current living situation, caregiver communication, and mental health conditions (Schwartz et al., 2019; Kushalnagar et al., 2018a; Engelman et al., 2021; Engelman & Kushalnagar, 2021). Causal influences at the social level are education level, caregiver and peer support, perceived independence, and marginalization (Schwartz et al., 2019; Kushalnagar et al., 2018a; Engelman et al., 2021). Influences at the organizational level are current policies and social services provided at federal, state, and local levels (Schwartz et al., 2019; Kushalnagar et al., 2018a; Engelman et al., 2021; Engelman & Kushalnagar, 2021). The environmental factor is location: rural versus urban (Schwartz et al., 2019). Demographic variables income, education level, and personal identity related to sexuality and gender are also consistently associated with food

insecurity (Schwartz et al., 2019; Kushalnagar et al., 2018a; Engelman et al., 2021; Engelman & Kushalnagar, 2021).

Three of the four peer-reviewed articles directly mentioned and measured DHOH individuals' feelings of loneliness and their relationship to overall food security (Schwartz et al., 2019; Kushalnagar et al., 2018; Engelman et al., 2021). Unfortunately, the COVID-19 pandemic only exacerbated the feelings of loneliness and food insecurity within DHOH communities (Engelman et al., 2021). Quantitative analysis from survey data indicated that worry about contracting COVID-19 and concerns about loneliness increase the likelihood of food worries beyond the explanation of demographic variables (Engelman et al., 2021). Out of 537 DHOH survey respondents, 42% ($n = 225$) worried about food shortages, 56% ($n = 300$) reported a high level of worry about possibly contracting COVID-19, and 54% ($n = 289$) responded "true" or "very true" when asked about feelings of loneliness following the implementation of stay-at-home guidelines (Engelman et al., 2021). Current pandemic effects highlight preexisting health disparities, including food insecurity (Engelman et al., 2021). Outside the scope of COVID-19 and the ramifications of stay-at-home guidelines, disabled individuals who live alone are three times more likely to be food insecure than those who live with a caregiver, family, or friends (Schwartz et al., 2019).

Demographic variables consistently predict food insecurity for all populations (Schwartz et al., 2019). Income, education level, gender, and sexual identity are some of the most influential determinants of food insecurity for DHOH communities, especially when combined with the variables of social support, communication, and chronic disease presence (Schwartz et al., 2019; Kushalnagar et al., 2018a; Engelman et al., 2021; Engelman & Kushalnagar, 2021). U.S. studies have shown that disabled populations need an income two to three times those of the general population to cover the costs of medical expenses, caregiver or interpreter fees, and special dietary needs (Schwartz et al., 2019). Decreased education and health literacy levels have been shown to reduce a DHOH individual's likelihood of following primary prevention strategies, increasing the probability of chronic diseases (Kushalnagar et al., 2018a). Gender and sexuality are also predictive factors of overall food insecurity. Deaf adults who identify as gender fluid or as a part of the lesbian, gay, bisexual, transgender, queer, intersex, and asexual (LGBTQIA+) community are almost twice as likely not to have enough money to feed themselves or their family compared to deaf non-LGBTQIA+ adults (Engelman & Kushalnagar, 2021).

Language Barriers and Using ASL

DHOH individuals face communication barriers in several social contexts. A communication barrier is especially evident within mixed hearing-deaf households and poses a risk to the overall well-being of the DHOH individuals. More than 90 percent of deaf children are born to hearing parents (National Institute on Deafness and Other Communication Disorders, 2021). Households where two languages, such as English and ASL, are used can present challenges. Hearing family members respond to each other in spoken English but only respond to the DHOH individual in ASL. Due to inconsistent use of ASL, family members may be unable to accurately interpret the emotional situation that often exists in a medical emergency (U.S. Department of Justice Civil Rights Division, 2003).

The main predictor of food insecurity reported throughout this review was communication barriers with caregivers, peers, healthcare providers, and social service organizations. An estimated 500,000 people in the United States use ASL as their primary language (Engelman & Kushalnagar, 2021; Simmons, 2020). These individuals are statistically predisposed to poor health outcomes due to the absence of incidental information, linguistic neglect, and lack of accessible social services (Schwartz et al., 2019; Kushalnagar et al., 2018; Engelman et al., 2021; Engelman & Kushalnagar, 2021).

Incidental information refers to verbal conversations only received through auditory means that convey information not only to the person or persons involved in the conversation but also to a person or persons who overhear the conversation (Kushalnagar et al., 2018). Unfortunately, many DHOH individuals who are unable to receive information in this way miss pertinent background information regarding overall health and wellness, negatively affecting health literacy levels (Kushalnagar et al., 2018; Engelman & Kushalnagar, 2021). Direct communication difficulties with DHOH individuals who primarily communicate through ASL significantly contribute to food insecurity status (Kushalnagar et al., 2018). In a survey study of 475 DHOH adults, participants were asked to recall caregiver communication through childhood. A total of 8% ($n = 38$) reported retrospectively understanding “little to none” of what their caregiver said, while 22% ($n = 104$) retrospectively understood “some” of what their caregivers said (Kushalnagar et al., 2018). Based on logistic regression results, the 8% who understood “little to none” of caregiver communication were five times more likely to “often” experience difficulty with food access, and those who responded to understand “some” communication were three times more likely to report unstable food security (Kushalnagar et al., 2018).

Linguistic neglect refers to the concept that deaf children are not provided adequate access to language development and communication (Kushalnagar et al., 2018). Nationally, deaf children whose caregivers do not use ASL are at risk for language development delays (Kushalnagar et al., 2018). Lack of communication consistently increases childhood feelings of isolation and loneliness, sometimes contributing to emotional neglect (Kushalnagar et al., 2018). Overall adverse childhood experiences, including but not limited to emotional neglect, directly contribute to later reports of adverse mental health outcomes (Schwartz et al., 2019; Kushalnagar et al., 2018). In addition, existing literature reveals that households considered food insecure are more likely to report a diagnosis of major depression or generalized anxiety disorder, which impacts an individual’s perceived quality of life. Deaf adults who identified their quality of life as “fair to poor” experienced food insecurity that was six times greater than deaf adults who identified their quality of life as “excellent” (Engelman & Kushalnagar, 2021).

In general, people with disabilities are often overlooked for social services at any organizational level. Local food banks, statewide programs such as Michigan’s Supplemental Nutrition Assistance Program (SNAP), and even federal disability benefits lack comprehensive accommodations for most disabled participants (Schwartz et al., 2019). Programs that cater directly to food security in the DHOH population are not standard, and the existing programs lack accessibility options, such as accessible language and proper communication methods (Schwartz et al., 2019). Existing literature suggests that older adults who use food assistance programs are less likely to be diagnosed with depression or obesity (Engelman & Kushalnagar, 2021). However, in light of the past, current, and future negative realities of the COVID-19

pandemic, the effects have put a strain on and have limited the resources and outreach of these programs. In fact, as of April 2020, 22.7% of all U.S. households reported feeling insecure and worried about food availability. Although food assistance services are beneficial to participants, they frequently are not significant enough alone to overcome food insecurity (Schwartz et al., 2019).

Discussion

This scoping review aimed to examine peer-reviewed journal articles published between 2017 and 2021 on the relationship between food insecurity among deaf and hard-of-hearing (DHOH) populations and language barriers for American Sign Language (ASL). The findings suggest that DHOH individuals in the United States face significant barriers to food security for several reasons. The limited research identified decreased food literacy if caregivers had a language barrier and overall lower incidental knowledge. Results also note that income level, mental health status, education level, and concerns surrounding COVID-19 and possible infection are significant predictors of food insecurity in the U.S. DHOH population (Schwartz et al., 2019; Kushalnagar et al., 2018; Engelman et al., 2021; Engelman & Kushalnagar, 2021).

Child-caregiver communication and COVID-19 are two additional links to food security and poor health outcomes. The communication distinction lies less in the method and more in the presence and comprehension of communication between children and their caregivers. The gap in comprehension can lead to gaps in food and health literacy and overall quality of life, creating a greater chance of food insecurity (Kushalnagar et al., 2018; Engelman & Kushalnagar, 2021). Over the past 2 years, the impacts of COVID-19 have also strengthened the link between the quality of life and food security because of increased social isolation, feelings of loneliness, job security, and community resources provided (Engelman et al., 2021; Engelman & Kushalnagar, 2021). Contributing factors to the overall problem of food insecurity in DHOH populations are not typically experienced singularly; in addition, if a deaf individual identifies as another historically marginalized group, such as LGBTQIA+, their chances of food insecurity increase (Engelman & Kushalnagar, 2021).

Limitations

Several limitations to this scoping review should be noted. Only articles published between 2017 and 2022 were considered. More articles could have been reviewed if the date range had been expanded. As only scientific, peer-reviewed publications are included in this review, establishment motives that may appear in grey literature, i.e., policy documents or reports, have not been included in our findings. This is a weakness, as there may also be relevant research results in this form of publication. The search was also limited to DHOH individuals in the United States that use ASL. Research results would have been more significant if other communication methods such as lip-reading and cued speech or communication aided by assistive technology such as cochlear implants, hearing aids, and closed captions were included. Overall, a more inclusive search strategy would have yielded more studies to review. In addition to the restrictive search strategy and limited data surrounding the topic, four of the five articles were written or co-written by the same authors. Having more variety in authors may have made the results of the studies more reliable.

The causal factors of food insecurity do not fall on whether or not an individual alone has a disability. Although a disability affects how a person learns, communicates, and consumes food, social and structural barriers related to a disability contribute to food insecurity. Considering that concept, future research suggestions regarding the DHOH population include college campus resources, access to community food resources, job security, transportation, availability of assistance, and nutrition education/levels of food literacy. The research could test potential interventions or, as mentioned by Schwartz et al. (2019), examine the circular relationship between barriers that DHOH individuals face and food access. These topics cover a minority of the gaps in current research related to DHOH individuals and the level of food security.

Conclusion

The use of ASL impacts food insecurity within particular populations, especially DHOH individuals (Kushalnagar et al., 2018; Engelman & Kushalnagar, 2021). There is very little research on the topic, and it should be further investigated. There should be more advocacy for caregivers to learn ASL when working with individuals who primarily communicate with ASL to address the identified issues. DHOH individuals and their caregivers should also receive education regarding nutrition to increase food literacy. Addressing these barriers could decrease food insecurity among DHOH individuals (Engelman et al., 2021; Engelman & Kushalnagar, 2021; Schwartz et al., 2019; Kushalnagar et al., 2018). Multiple contributing factors create a food-insecure individual, but no single contributing factor had a more significant impact than the others. The results from this scoping review and similar research should be used to inform policymakers to serve the DHOH population in the United States better. In addition, focus groups could be conducted within the DHOH population to help food organizations provide better resources. Another study could be conducted to provide more awareness of health literacy and how it can play a role in food insecurity within the DHOH population.

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Table 1*Characteristics of included studies.*

Author, Year	Country	Title	Study Design	Study Participants	Results
Schwartz et al., 2019	United States	Disability and food access and insecurity: A scoping review of the literature	Scoping Review	Reviewed 106 quantitative and qualitative articles comparing disability and/or physical impairments in conjunction with food access, food (in)security, or food deserts	Disability is consistently associated with an increased risk of food insecurity across different populations and geographic settings. Higher rates of food insecurity are associated with economic and organizational barriers. Social and environmental factors limited physical access to food for people, often in conjunction with economic barriers. Social norms play a key role in the construction of disability, which can be seen in experiences of food access.
Kushalnagar et al., 2018a	United States	Communication barrier in families linked to increased risks for food insecurity among deaf people who use American Sign Language	Survey	475 Deaf adults ages 18–95 years who use ASL as their primary language	Communication barriers in an individual's developmental years predispose them to sometimes experiencing food insecurity five times more than individuals who report understanding some or all of their caregivers' communication.
Kushalnagar et al., 2018b	United States	Critical health literacy in American deaf college students	Qualitative Study	38 Deaf undergraduate students who use ASL	Functional health literacy nor discussion of medical history with family was associated with critical health literacy. Health related discussions with friends positively impacted critical health literacy scores among the Deaf participants. missed incidental knowledge around family can possibly be compensated with conversations with health literate friends.

Engelman et al., 2021	United States	Food worries in the Deaf and hard-of-hearing population during the COVID-19 pandemic	Survey	537 DHOH adults living in the United States	Worrying about contracting COVID-19 and concerns about loneliness increase the likelihood of food worry beyond aspects explained by age and education level.
Engelman & Kushalnagar, 2021	United States	Food Insecurity, chronic disease and Quality of Life among deaf adults who use American Sign Language	Survey	630 Adults who use ASL	Low perceived quality of life is significantly associated with food security status after controlling for sociodemographics, depression, and chronic conditions.