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## The Development of a New Scale to Measure Food Insecurity Among Older Adults Using the International Classification of Functioning, Disability, and Health (ICF) Framework

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## THE DEVELOPMENT OF A NEW SCALE TO MEASURE FOOD INSECURITY AMONG OLDER ADULTS USING THE INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY, AND HEALTH (ICF) FRAMEWORK

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*While an estimated 8.9% or 4.9 million adults ages 65 and older lived in poverty in 2019, additional factors affect the ability to access food. This qualitative study utilized in-depth semi-structured interviews with older adults living in senior living facilities in Northeast Florida to identify barriers and lived experiences related to food access, components of nutritional functioning, and food insecurity. Based on the findings, participants commonly reported problems related to personal transportation such as financial limitations, not having a car, and not feeling safe driving under the use of prescribed pain medications. Additionally, lack of financial resources and medical expenses were reported to be limiting factors in their ability to pay for food. Participants also mentioned external and internal aspects of housing as problems that limited their ability to shop, prepare, or eat food. Age-related mobility problems, meal preparation challenges, and dentition issues were also reported as barriers to adequate food access. This study found that assessing food security risk based solely on food availability was insufficient. Future research should include more geographic and household diversity among respondents.*

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**Background** | Food security is defined as "when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life."<sup>1</sup> Four dimensions are distinguished: 1) the "availability" of adequate quantity and quality of food, 2) "access" to food considering economic and physical aspects, 3) "utilization" of food which encompasses the ability to prepare safe and nutritious meals, and 4) food "stability" based on time and season.<sup>2,3</sup> Individuals who cannot reach one or more of these dimensions would be considered food insecure, and the degree may vary from mild, moderate, or severe.<sup>3</sup>

Most scales that measure food security fail to assess all four dimensions of food security.<sup>2,3</sup> Available scales primarily focus on the access dimension, mainly financial, resulting in an underestimation of the prevalence of food insecurity among specific populations, especially older adults.<sup>4</sup>

While an estimated 8.9% or 4.9 million adults ages 65 and older lived in poverty in 2019,<sup>5</sup> additional factors affect the ability to access food. For the purpose of this paper, nutrition functioning

represents behavior and activities necessary for nutritional health and include components such as the ability to access, prepare, chew, swallow, and digest food. Research conducted among older adults receiving home-delivered meals found food-related challenges ranging from physical and cognitive function, psychosocial issues, and transportation.<sup>6</sup> Common challenges include chewing difficulties, dysphagia, inability to manipulate equipment to prepare and eat food, and an inability to grocery shop. Cognitive impairments and psychosocial characteristics include depression, anxiety, loneliness, and isolation.<sup>7-9</sup> Medications or disease processes can alter taste or reduce appetite, which affects intake.<sup>10</sup> Transportation issues and community-wide availability of nutritious food often impact food security.<sup>6</sup> In addition, past experiences with food deprivation can influence one's perception of food security.<sup>11</sup>

International Classification of Functioning, Disability, and Health Framework (ICF), which describes the health components of functioning and disability, was used as a framework for the interview guide and development of the survey subscales.<sup>14</sup> The

ICF views health and disability in a single spectrum and formulates human functioning in multiple dimensions using a biopsychosocial view. How health conditions impact functioning is considered within the context of environmental and personal factors.<sup>14</sup> To date, there are no nutrition-related ICF components, and "nutritional functioning" has yet to be operationalized as a multidimensional construct.

Due to the complexities associated with older adults experience with food insecurity, it is necessary to develop a scale that considers these aspects. This study aimed to understand the components of nutrition functioning in relation to food insecurity to develop a more accurate screening tool for older adults.

**Methods** | This qualitative study utilized in-depth semi-structured interviews with older adults living in senior living facilities in Northeast Florida between October 2021 through January 2022. A purposive sampling strategy recruited representatives from four groups: 1) low-income, food insecure; 2) low-income, food secure; 3) higher income, food insecure; and 4) higher income, food secure. Income classifications were based on the 2021 United States Federal Poverty Guidelines.<sup>13</sup> The two-item United States Household Food Security Survey<sup>14</sup> was used to assess and categorize food security status. Inclusion criteria required participants were at least 65 years of age; exclusion criteria included the inability to consent to participate verbally. Participants were recruited through flyers and case managers from their respective facilities; participation was voluntary. The research team directly contacted those who wished to participate via phone. The study was approved by the Institutional Review Board at the University of North Florida.

A semi-structured interview guide based on the ICF framework was developed to identify barriers and lived experiences related to food access, components of nutritional functioning, and food insecurity. The guide included 34 open-ended questions based on five domains: 1) Body Function & Structures; 2) Activities; 3) Participation; 4) Contextual factors: external; 5) Contextual factors: internal.<sup>12</sup> The interview guide was piloted with three test participants and refined for clarity.

The interviews occurred via Google Voice and were simultaneously recorded using Zoom. The interviewer, a registered dietitian trained in qualitative methodology, explained the research aims and obtained verbal consent before beginning the interview. Once consent was obtained, participants responded to the two-item US Household Food Security Survey and were asked about their annual income. The audio files were transcribed using the Zoom software and anonymized and edited for accuracy.

Transcripts were analyzed using thematic analysis. Initial codes were based on the ICF framework, and two investigators independently analyzed the data for emerging themes and subthemes and reviewed and coded the transcripts. After the data were individually coded, the investigators compared their coded transcripts. When a new code was identified, the coders conferred, and if both agreed, the new code was added to the codebook. Saturation, as defined by no new codes emerging, was achieved after 23 transcripts were reviewed.

**Results** | Twenty-three individuals participated in this study. The majority were female (73.9%) living in single households (95.7%) with an age range between 66-87 years (mean = 75.7; SD=6.79). Participant characteristics are shown in Table 1.

Nine themes and twenty-two subthemes were identified based on the five domains of the ICF framework. Due to the similarities in the personal and participation ICF domains, these constructs were merged. Table 2 outlines the interviews' major themes, subthemes, and representative quotes.

#### 1) Environmental Factors

This domain encompasses external factors influencing the ability to access, store, and prepare food.

#### *Transportation*

Public transportation and driving limitations were routinely reported as limitations to purchasing food. Some participants reported problems with public transportation, including reduced bus schedules, bus delays, and the limit stipulated for carrying bags, which made it harder to access and purchase food when needed. One participant reported:

*"I'll go all the way to the bus stop on waiting for the bus and then I gotta wait like 75-80 minutes and it's hot outside, so I just come back home.... it's very, very, very [frustrating]."*

Commonly cited problems related to personal transportation included financial limitations, not having a car, difficulties driving at night, traffic concerns, and not feeling safe driving under the use of prescribed pain medications. One participant reported that they did not drive because of the traffic, whereas another reported that visual impairment makes driving harder.

#### *Access/Variety*

Lack of financial resources often limits the ability to obtain adequate food. Medical expenses required some participants to choose between purchasing food or paying medical bills. Others noted constant worry about having enough food, which required them to search for food assistance continually.

*"Yes I had a...very serious heart attack and my medication was very, very expensive, so I ran out of money before the end of the month and um I was having a hard time feeding myself."*

It was also mentioned that although food assistance was accessible, there was little variety since some food provided was incompatible with dietary requirements due to existing chronic conditions. Food price inflation and insufficient Supplemental Nutrition Assistance Program (SNAP) benefits were also reported to make it more challenging to purchase healthy foods.

#### *Housing*

Participants mentioned external and internal aspects of housing as problems that limited their ability to shop, prepare, or eat food. Carrying groceries upstairs due to elevator problems, issues preparing food because of small kitchen appliances, and inadequate storage space for food due to small apartments were all cited.

*"I only get enough for like 2 or 3 days at a time because the kitchens are really small."*

## 2) Activity

#### *Mobility & Aging*

Mobility problems and aging were predominant issues that influenced food access and utilization. Chronic pain limited participants' ability to walk, stand, or sit, making purchasing and preparing food increasingly challenging. Similarly, lack of energy and balance problems were common concerns.

Another issue reported was difficulty carrying/lifting food purchases and kitchen equipment. Some said they had to make several trips to carry all their bags from their car to the apartment, while others mentioned that their functional capacity limited their ability to carry heavy foods. Participants who walked or biked to purchase groceries reported that they limited their purchases to allow them to carry all their bags in a single trip.

*"I have an artificial hip, and my right legs are broken so I can't carry too much at one time."*

Assistive equipment made it more challenging to purchase food since several depended on access to in-store electric scooters. Stores often had limited units or were faulty and inoperable. Assistive equipment also made it more challenging to prepare food at home since they often use bulky equipment in a small living space. For some, assistive equipment aided in purchasing and preparing food. Those that reported using walkers or rollators would often place extra bags of food on the equipment to assist with carrying groceries. Others preferred a wheelchair for cooking as they could spend more time preparing food without additional fatigue in a seated position.

## 3) Personal/Participation

#### *Food Preparation*

Challenges with preparing meals that hindered participants' ability to get enough food included a lack of desire or energy. One participant said she no longer cooked as she lost the desire after her husband passed away. It was frequently mentioned that participants do not cook or do anything beyond heating pre-prepared foods.

#### *Interpersonal Relationships*

The Interpersonal Relationships theme had both positive/protective and negative connotations. The positive/protective subtheme included protective interpersonal relationships and helping others. The negative subtheme included a lack of interpersonal relationships and predictive relationships.

Family and personal relationships were essential for accessing adequate food. Some stated they could get by if they did not rely on their interpersonal resources; however, it was evident that these relationships were protective against food insecurity. Even short durations without interpersonal resources resulted in worry about accessing enough food.

*"...I have a son that takes me to buy groceries... And without him I don't know what I would do because he had jury duty this week and I was so worried because I was afraid they were gonna keep him for a while."*

Other relationships identified included neighbors, church groups, and facility coordinators. While several had family or other resources nearby, they were hesitant to ask for help as they worried about being a burden. More concerningly, one mention of interpersonal resources not following through on their commitments resulted in missed meals. Additionally, some felt very strongly about

helping others even when they struggled to make ends meet.

#### *Food Assistance*

Food Assistance was broken down into negative or neutral and positive or protective subthemes. Since many of the interviewees were receiving home delivered meals, the most common responses related to the convenience of the meals provided as they only required heating. Other positive responses included the comradery and weekly interactions with the delivery volunteers.

Given the time frame of the interviews, participants that received SNAP benefits often mentioned that their benefits had recently decreased due to the end of the temporary additional COVID-19 emergency allotments. While several noted that the increased emergency benefit was helpful, most of the negative feedback was about the inability of their current SNAP benefits to meet their food needs.

*"...we get food stamps, it's \$19 [per month] in food stamps. I don't know what the \$19 is supposed to do."*

Other pitfalls of food assistance from meal delivery programs, congregate meals, and food pantries included the challenges of meeting nutritional needs due to chronic disease.

#### 4) Body Functions/Structure

##### *Dentition/ingestion/digestion*

Among low-income participants, several mentions of needing new dentures or teeth removed may have impeded food intake or limited food options. Among higher-income participants, there were some reports of dentures or partials making it harder to consume various foods. Others attributed their digestive problems to their inability to chew food adequately. Some reported that underlying health conditions resulted in dysphagia which reduced their ability to consume certain foods.

##### *Health Conditions*

Chronic conditions influenced food choices and further limited food options for many participants. Diabetes and hypertension were the most cited chronic conditions that affected food choices.

*"... we get food bags once a month and due to the fact that I'm diabetic and uh have a heart condition, they have too many foods with carbs that I couldn't eat."*

While there were many reports of incontinence, all either planned and wore absorbent underwear or padding to reduce the risk of it interfering with shopping, cooking, or eating.

Memory-related concerns did not seem to interfere with participants' ability to shop, prepare, or eat food; however, they did require a proactive approach. It was commonly reported that shopping lists were needed. One participant expressed the need to write reminders to eat on sticky due to lack of appetite and forgetfulness. Another concern was forgetting to turn off kitchen appliances which limited kitchen equipment use and the ability to prepare certain foods or meals.

*"... as my memory dulls down I'm afraid I'll leave something on the stove and burn it..."*

Several stated that their vision restricted their ability to perform some activities of daily living, such as cooking and preparing food or choosing healthful items based on food labels.

Lastly, mental health concerns were more commonly noted among higher-income individuals. Frequently reported stressors included loneliness, chronic illnesses, aging, and current events.

#### ***Development of the Food Insecurity Scale***

After identifying the themes and subthemes, the initial version of the Older Adult Food Insecurity Scale (OAFIS) was developed. This scale addresses the four dimensions of food security and assesses food and nutritional risk among older adults. The survey items, themes/subthemes derived from this study, corresponding ICF component, and food security domain are presented in Table 3. The OAFIS is currently in the pilot phase to assess the validation and reliability of the tool.

**Discussion** | We identified four domains within the ICF pertinent to food insecurity risk among older adults. While existing validated food security instruments tend to focus on the access domain of food security,<sup>15,16</sup> to the authors' knowledge, no validated tool exists that considers all domains of food security<sup>2</sup> and challenges specific to older adults. The themes and subthemes identified are consistent with the current literature evaluating barriers to food security among older adults. Physical ability,<sup>17,18</sup> psychosocial factors,<sup>8</sup> and chronic diseases<sup>19</sup> have all been implicated as predictors of food insecurity in older adults.

This study found that assessing food security risk based solely on food availability was insufficient. While many interviewees expressed that they had food available, environmental factors, such

as access to various foods, were often limited. This is particularly concerning given that older adults with multiple chronic conditions have been shown to have a greater risk of food insecurity<sup>19</sup> despite the need for healthy foods to control their conditions. Several participants reported access to canned or packaged foods through food pantries; however, these were consumed as a last resort as it was recognized that these foods did not fit with a healthy diet. Similarly, Warren et al.<sup>10</sup> found that while older adults receiving food assistance recognized the need to decrease the consumption of less healthful foods, more nutrient-dense options were often too expensive. Those receiving SNAP benefits felt their benefits did not go far enough to meet all their dietary needs. Previous literature has found that older adult SNAP recipients are more likely to be food insecure,<sup>20</sup> suggesting that these supplemental benefits are inadequate in ensuring adequate access to food.

Many factors beyond economic resources affected the access dimension of food security; within this study, each domain negatively asserted some influence on food access. Participants repeatedly mentioned issues related to physical limitations and the aging process. This finding is consistent with previous literature, indicating that older adults with physical limitations were more likely to be categorized as having very low food security.<sup>17</sup>

Transportation issues were frequently reported as limiting factors in purchasing adequate food. These limitations make it difficult to plan meals within budget<sup>10</sup> and increase the dependency on family and friends to access stores.<sup>21</sup> Additionally, lack of social support and loneliness has been associated with higher odds of food insecurity among older adults.<sup>8</sup> We found that those lacking interpersonal resources often struggled to find reliable transportation and consistent access to a variety of foods. Green-LaPierre et al.<sup>21</sup> reported that low-income older women living in single households often relied on family members to help with transportation, care during illness, and financial resources.

Disinterest in cooking/eating, chronic pain, assistive equipment, memory issues, chronic diseases, cooking for one person, and the limited

shelf-life of plant-based foods were cited as barriers to food utilization. Meals that could be easily prepared or fully prepared that only required heating were prevalent among participants. However, frequent use of convenience and ready-prepared foods often correlates with poorer diet quality.<sup>22</sup> Soriano et al.<sup>23</sup> found that older adults with difficulties with meal preparation had more significant depressive symptoms and functional declines.

Current food security instruments risk false negatives among older adults due to a lack of exploration of factors beyond financial and access-related concerns. The OAFIS intends to depict food insecurity risk more accurately and identify individuals needing support services. Future research should assess the validity and reliability of this scale in different populations of older adults to allow for a more comprehensive food security risk assessment for programs associated with the Older Americans Act and within large-scale population studies.

Limitations of this study include the lack of geographic and household diversity. However, this is the first study to address the components of nutrition functioning in relation to food insecurity among older adults, providing a new food insecurity scale considering all domains of food security.

### **Implications for Public Health Practice**

This study demonstrates that food insecurity among older adults is a multidimensional problem, which reflects the importance of using an expanded scale to assess all pertinent dimensions. OAFIS addresses the four food security domains and other factors affecting food security specific to older adults, thus providing a more accurate assessment of food insecurity risk. This instrument aims to reduce underreporting of food insecurity among older adults and intends to identify support services needed. Future research should evaluate the validity of this scale in different geographic locations nationally and globally. From a public health policy standpoint, this multidimensional scale aims to become the standard scale used by case managers working in programs for older adults, population-based studies, and in programs under the Older Americans Act.

**Table 1.** *Characteristics of the Participants (n=23)*

| <b>Characteristics</b>                      | <b>% (N)</b> |
|---|--------------|
| <b>Sex</b>                                  |              |
| Female                                      | 73.9% (17)   |
| Male  | 6.1% (6)     |
| <b>Type of household</b>                    |              |
| Single Households                           | 95.7% (22)   |
| Others                                      | 4.3% (1)     |
| <b>Age (years)</b>                          |              |
| 65-74                                       | 47.8% (11)   |
| 75 and older                                | 52.2% (12)   |
| <b>Group</b>                                |              |
| Low-income and food insecure                | 34.8% (8)    |
| Low-income and food secure                  | 17.4% (4)    |
| Higher income and food insecure             | 26.1% (6)    |
| Higher income and food secure               | 21.7% (5)    |
| <b>Nutritional assistance</b>               |              |
| SNAP benefits and home meal delivery        | 43.5% (10)   |
| Only receiving home meals delivery          | 17.4% (4)    |
| Only receiving SNAP benefits                | 26.1% (6)    |
| Not enrolled in any type of food assistance | 13.0% (3)    |

**Table 2.** *Major themes, subthemes, and representative quotes from participant interviews (n=23)*

| Major Theme    | Subthemes             | Representative Quotes  |
|----------------|-----------------------|--|
| Transportation | Public Transportation | <p>“And now, if you want to go to the store, and see, if your handicap, you have a lot harder of a time to get to like Winn-Dixie, or, or, Publix, or any of the shopping stores. Plus, you have to take two or three buses to get to your doctor appointment now. Used to be, only, you know, you could take one bus. And that's kind of affected my shopping because of the fact that they discontinued. “</p> <p>“I'll go all the way to the bus stop on waiting for the bus and then I gotta wait like 75-80 minutes and it's hot outside, so I just come back home.... it's very, very, very [frustrating].”</p> <p>“I do when we have the city bus, if it ever runs. It takes- you know, this sounds crazy Winn-Dixie is exactly one mile from my house but to take the city</p> |

|                       |                                    |   |
|-----------------------|------------------------------------|---|
|                       |                                    | <p>bus it takes us one hour. And one hour to come back and that's also walking in between.”</p> <p>“...and it's true the bus has a limit. They have an announcement that tell you what or how many bags that they don't want you to carry bags that you have to occupy the next seat. That whatever you pick up should be able to- like for me but for a person that can only 2 or 4 bags depends on what size of bag you have. I try to go along with the what the [inaudible] something with the rules. I go along with the rules of the bus. Whatever it says that you shouldn't do, I go along with it. I never purchase and carry 10 bags when I'm told I'm not allowed to.”</p>   |
|                       | <p>Driving Limitations</p>         | <p>“Yes, exactly [she's not able to get to the grocery store as often as needed]. And I have no car. [when asked if there was a time when her son wasn't available to take her to the store] Oh yes. Yes, I've had a lot of those...[when asked if she has a way to get to the store when her son is not available] No, I just wait sometimes three weeks before I can go again. Any time I have three weeks to wait [to get to the store] I never usually have any- I'm ready to go whenever he is.”</p> <p>"...sometimes I can't go [to the store] because we don't have a car so like when it's a food giveaway or a food drive, we would love to go, but we can't go because we don't have a car, we are on the bus."</p> |
| <p>Access/Variety</p> | <p>Lack of Financial Resources</p> | <p>“...it was when I had I'm having so many medical bills and everything right now and with just \$20 a month I kind of think oh I kind of think, do I buy groceries or pay bills? [laughs] And I split. [when asked if paying medical bills rather than buying food] Yes.”</p> <p>“Oh yeah, yeah, and you know...if you want to eat good and you wanna eat all the nutritious meals, it's going to cost you more...cause you can...go to McDonald's and when they have dollar burger days, you know, and you buy a hamburger for less than you can ever...take it home and cook it. [...] I got to really eyeball prices on food. That's why I really can't afford mixed nuts and things of that nature....”</p>             |



|                  |                                      |  |
|------------------|--------------------------------------|--|
|                  |                                      | "Yes [clears throat]...I had a...very serious heart attack and my medication was very, very expensive, so I ran out of money before the end of the month and um I was having a hard time feeding myself."  |
|                  | Lack of access to a variety of foods | <p>"No, no, not consistent and we try to get something to eat all the time now....[when asked about variety] hmmm...well a couple of times a couple of times we had something, but it wasn't, you know, a variety, so it wasn't enough for both of us, but we did survive."</p> <p>"I didn't eat it in time [fresh vegetables] and it had wilted, and I didn't have money to buy more, and that was the week you guys wasn't serving food for us. So, I was like kind of short, so I just went on a weekend fast...I mean it's just sometimes, it's not like all the time. It's not often, it's just sometimes."</p>                               |
| Housing          | Exterior housing issues              | "Well, let me put it this way, I live on the 5th floor and sometimes if you go shopping you got to lug it all the way up, but you know, not really a big deal. [when commented that I hope he has an elevator] Oh yeah, but sometimes you got to wait forever so to hell with it...especially with COVID...yeah, it's better to just walk so I can get it over with."  |
|                  | Interior housing issues              | <p>"I live in an apartment, and we have, like the tiny little stoves...that are small [...] Sometimes it gets a little chancy whenever we first buy groceries. And come home my son helps me put up put the stuff away and sometimes it's a little difficult to find enough room but most of the time we can find enough room if we're careful."</p> <p>"No. I only get enough for like 2 or 3 days at a time because the kitchens are really small....So, the stove is really small, the refrigerator, it's small. So it doesn't hold a lot and then there's not really a whole bunch of cabinets. [does this limit what you purchase?] Yes."</p> |
| Mobility & Aging | Pain                                 | <p>[when asked about chronic pain, loss of muscle, lack of energy, and shortness of breath] "Oh yeah, to all of it. You hit a certain age and things start falling apart...shopping is becoming more difficult. I've had knee surgeries. I've had 5 surgeries and only have two knees."</p> <p>"I have chronic pain so I do go to pain management...Sometimes if I'm in a lot of pain</p>  |

|  |  |   |
|--|--|---|
|  |  | <p>because if I take my pain pills, then I can't drive there. Line 104: you know, my leg pain sometimes” [limits shopping, preparation of food].</p> <p>"[Does the pain ever make it harder for you to even cook and eat food?] Yes. [Okay, and does the pain ever prevent you from getting to the store, too.] Sometimes, yeah...When the weather's nice like today, I don't have no problem. But like last weekend when it was cold, I didn't even leave the apartment. It hurt to walk."</p>   |
|  | Aging & frailty                                | <p>“I need the grocery cart to hang on to or walking out in the hall and drag although Walmart bags and I have to be careful where I step and make sure I'm holding onto something, or I'm balanced in some way...I can't go down steps because of knee issues and weight. I can't use, I have to have two points of balance. I guess it would be two, because I can't put all the weight on one leg to step up a step...if I fall, I can't get back up. My legs won't push me back up off the floor. [as she ages] ...it gets more difficult, it's getting harder to get a balanced meal cooked...”</p> <p>“occasionally I think I'm superwoman and I get extremely tired, and it's just I'm too tired to cook anything, or even, you know, I'd rather sleep than eat, I guess.”</p> |
|  | Difficulty carrying/lifting                    | <p>“Well, sometimes I try to you know get stuff that's not heavy because of the stroller. If I put him in it, and then I can put- It has a basket under it where I can put things so I have to sort of you know, be careful about getting big bags of apples or something like, you know, or fresh pineapple something big like that, you know, I have to wait until I can have access to my car.”</p> <p>"I have an artificial hip, and my right legs are broken so I can't carry too much at one time. I try to a little bit- I try to break it down to 3 trips. Right. [when asked how many bags of groceries can get at one time?] Maybe four, but not too heavy."</p>  |
|  | Challenges associated with assistive equipment | <p>“...and I use a rollator so when I'm in the stores, I do have to use a- their scooters. And I have to plan to get, especially Aldi's because they only have one scooter per store.”</p>  |

|                             |   |  |
|-----------------------------|---|--|
|                             |   | "Umm yes, it does it really does [use of walker or cane make it harder to shop and prepare food]. It- the walker I use in the house and the cane in the house and the apartment, and it does make it harder because I also have back problems..."  |
| Preparing Food              | Challenges with preparing meals                           | <p>"Hmmm...well, you know, if you could call making sandwiches or a salad, you know, so that's not actually cooking, is it? [when asked if she doesn't cook often, only prepares sandwiches and heat up food] Yeah, and occasionally I'll make soups..."</p> <p>"Uh I cooked for so long....I just get tired of cooking and planning a menu. Exactly. Or the will to, you know, I'm just tired of doing that same old, same old. No, cause I'll stand in front of the refrigerator and look, you know, I have food in it but uh, I don't know what I want to eat at times. That I don't have to cook or prepare, you know, chop or whatever."</p> <p>"...I'm lazy."</p>  |
| Interpersonal relationships | Predictive or lack of interpersonal relationships         | <p>"I have transportation to the grocery stores, but no family. I'm an elder orphan. That's a real term, I didn't know it. [when asked if friends or neighbors help with food or groceries] No, no. I have a friend who can help every now and then, hm but she has a large family and they're out of town a lot, but she does help when she can."</p> <p>"I have a son that lives here, son and daughter-in-law and they are very, very busy, and I don't want to be a burden to them, so you know I try to remain independent with getting food and so forth."</p> <p>"Yeah, I dont have any family, I never married, I never had kids. And my cousins live in Connecticut and the other one lives in California, so I don't have no family in Florida, but I was born here. The doctor thinks I have, he asks all the time, "How do you go to the store?" he thinks I have help..."</p> |
|                             | Protective interpersonal relationships and helping others | "...I have a son that takes me to buy groceries... And without him I don't know what I would do because he had jury duty this week and I was so worried because I was afraid they were gonna keep him for a while."  |

|                        |                         |  |
|------------------------|-------------------------|--|
|                        |                         | <p>[when asked if he ever eats less so his friend can have enough] “Yeah, if he needs it, I got no problem giving him food out of my own, you know, refrigerator, whatever. [when asked if there has been an instance where he gave his friend food and he didn't have enough] Oh, not really but you know once in a while...I wasn't gonna starve if I had to wait a day, you know.”</p> <p>“...the [meal delivery program] I did [turn down] cause I didn't want to hinder nobody else that couldn't get up like I do and cook and stuff. So I felt bad, so that's one reason I got off the program cause I know some people can't get up and do for themselves and I didn't want them to miss out getting that program. It's not about me, it's always not about me all the time anyway.”</p>   |
| <p>Food Assistance</p> | <p>Positive aspects</p> | <p>“[in reference to home delivered meals] Yeah, that's what keeps me going.... I don't have to shop. I can just sit down, nuke it, and eat.”</p> <p>[about receiving home delivered meals] “...they're a big help. Yes, there are times, you know, part of it is whether, not whether you have a little food in the pantry that you can eat but whether you can get up and fix it. Sometimes I just have to wait, you know, I I get enough food like what I get from [home delivered meals]. I can make that last two meals actually. As long as [home delivered meals] continue, I do. I know that every Friday they're going to bring me five meals and I know that I can last through weekend til Tuesday of next week...they're my favorite people to see when they knock on my door...I don't let anybody book me or schedule me for anything so I can be sure that I'm here to get it cause you have to open the door to get it. They won't hang it on the doorknob.”</p> <p>“the [home delivered meals] brings me food, so you know, I get an ample amount, its just the variety and uh I get an ample amount. Uh, to me it's, you know, I know I'm going to be fed. And you know, it's up to me, to make 'em...but I know I'm going to be fed and that's a relief.”</p> |

|                                      |                         |   |
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|                                      |                         | <p>“Yeah, we have a- on the third floor. They have uh- I think they call it a food bank. But I haven’t been up there, but they do have a food bank here. So if you run out of food you can go up there and get some.”</p>   |
|                                      | <p>Negative aspects</p> | <p>“...we get food stamps, it's \$19 [per month] in food stamps. I don't know what the \$19 is supposed to do.”</p> <p>“yeah, Aetna doesn't offer up food. But next year starting, January one uh they’re supposed to I think offer food, they send you a food card, you have to go to Walmart or something like that and 50 bucks a month, so 50 bucks is not a lot of food in a supermarket if you are buying a bunch of crap, but I don't I don't buy crap so it works for me.”</p> <p>“When I do get my stamps, I try to get my groceries to last a month.”</p>   |
| <p>Dentition/Ingestion/Digestion</p> | <p>Dental issues</p>    | <p>“I can only chew on one side. The other side my other tooth is likely almost totally rotten out. But I've been putting sage oil on it and that helps with the pain and it's like it helps but I can't like chew on my right side...then my teeth for some reason are spreading apart so certain foods get caught all down in my teeth...it does affect what I can eat...like meat or like steak or something like that. Even if I hadn't switched over to eating vegetables, I wouldn't be able to eat it because it would be all stuck up in my teeth.”</p> <p>“I can't bite down on the bottom here and like I said, I have full dentures on the top. Well, in the bottom here there's some teeth removal that needs to be done and that causes me not to be able to eat a certain things...I can do bananas so but anything hard, like my apples they can't bite down on I can do the strawberries and blueberries and so forth...”</p> <p>“You know, I do have dentures, I don't have no bottom teeth or cavities in my mouth. What happened is when I got these dentures it's just that my gums, so I had to get 'em pulled. And, you know, and um but I'm fine, I eat pretty good...it's just the way you eat. When you got dentures, you don't just pick up a neckbone, or a chicken bone and</p> |

|                   |                                     |  |
|-------------------|-------------------------------------|--|
|                   |                                     | <p>bite down. You don't do that [both laugh], you don't eat like that...I eat very careful and properly.”</p> <p>“I have false teeth and so it's hard to chew it up good sometimes up good enough to swallow it. That's one reason I don't eat a lot of meat. I just keep ground meat that I can put in the blender, if nothing else....It's hard to eat vegetables.”</p>  |
|                   | Difficulty swallowing and digestion | <p>"[...] about 10 years ago my [esophagus] went in reverse...then I couldn't hardly eat anything and it had to be really soft foods. Uh, I will have times, where I can't eat as much, you know, or once in a while I might be able to choke if I have certain foods now, like cornbread, anything that is grainy [...]"</p> <p>“You know, you don't have as much digest- as good a digestive system when you're older as you do when you're younger and it affects what I fix to eat....”</p> <p>“I have problems swallowing some time, because that is because of my...the hyper...the thyroid, my thyroid. Yeah yeah yeah yes it keep me from swallowing good sometimes and see I can't I don't do meat beef meat a lot, I had some yesterday, that was the first time I had some in a good while.</p> |
|                   | Lack of appetite                    | <p>“I'm on a medication that I uh- my taste is uh I can't- I can tell the difference between sweet and savor- salty and sour but not- I probably wouldn't be able to give you the ingredients that are involved in, you know, a certain meal. Uh smell I can, it's not, I still have some but not like it used to be.”</p> <p>“Yeah, sometimes I just don't have an appetite at all, but I eat, you know because you got-, you know, not force myself, but once I start to eat it's good, but, you know, so I'm you know I'm not hungry, but I know I have to eat so sometimes I just forge ahead, but once I start, you know, my appetite comes back.”</p>  |
| Health Conditions | Chronic conditions                  | <p>"I live in a senior apartment complex, and we get food bags once a month and due to the fact that I'm diabetic and uh have a heart condition, they have too many foods with carbs that I couldn't eat."</p>   |

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|  |                      | <p>“When I go to the grocery store I've got to really check to make sure I get items that's got very little sugar in them and things like that and it's got we're anymore, you can hardly find say- I can find string beans with less sodium, but most of your other vegetables are regular it's really hard to find the less, sugar and salt items in the store. So it makes it hard when you're buying groceries. Lines 44, 46: I don't hard buy any canned stuff. It's usually the raw so i can cook it to suit me. [when asked about snacks] I try not because I'm a diabetic.”</p> <p>“I do have [gastroparesis] which I'm only allowed certain things...I'm not allowed any sauces, so gravies, no milk products, [laughs] no ice cream, no pudding. No raw vegetables. So it it really makes it difficult to pick what I can have to eat.”</p> <p>“...but it just depends on how it's cooked. Like if it's fried, I can't eat it. [when asked about conditions that affect her intake] just my blood pressure, my asthma, stage 3 kidney failure. So, that's another thing I have to watch what foods, I put in me because my kidneys.”</p> <p>“I've got to where I only eat mixed vegetables, frozen and uh because I'm not supposed to be consuming sodium [due to health reasons]. I'm dizzy headed...even if they have a meal here, I don't go to it because they put sodium and all in and they don't they don't ever let that out because everybody is not on the same diet.”</p> |
|  | <p>Mental health</p> | <p>[when asked if sadness or loneliness affects the ability to shop or prepare and eat food] “I would say umm every day...I think the only bad thing about getting older, because I don't mind uh facin' dying but uh it's the loneliness of it.”</p> <p>“Yeah, sometimes I just don't have an appetite at all, but I eat, you know because you got-, you know, not force myself, but once I start to eat it's good, but, you know, so I'm you know I'm not hungry, but I know I have to eat so sometimes I just forge ahead, but once I start, you know, my appetite comes back.”</p>   |

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|  |                        | <p>“I'm on a medication that I uh- my taste is uh I can't- I can tell the difference between sweet and savor- salty and sour but not- I probably wouldn't be able to give you the ingredients that are involved in, you know, a certain meal. Uh smell I can, it's not, I still have some but not like it used to be. [when asked if that ever makes food less appealing] Yeah, it makes it, you know I, I think it has a lot to-, you know, the colors and everything I, like, you know orange and yellow on different colors, green, and not bland looking or tasting foods. [when asked if eating less because of these issues] Yes.”</p>  |
|  | <p>Memory concerns</p> | <p>"I don't fix much other than frozen vegetables, I use my microwave for most everything. Uh cause as my memory dulls down I'm afraid I'll leave something on the stove and burn it, you know. "</p> <p>“Sometimes I have to remember that I haven't eaten. I have to put notes on my cabinet doors. As you get older your memory's not as sharp as it used to be. [when asked if memory ever makes it difficult to shop or prepare or remember to eat food] oh sure. It's frustrating when you think you've got everything you need [from the store], but you don't. Even when you carry 'em in. I know it sounds like we're only half there...[when asked about other issues that affect appetite] I think it's forgetfulness and age.”</p> <p>“...three times I was supposed to get lettuce, and three times I either didn't get it online, or walked out of the store without it...and now I'm waiting to remember to get green onions.”</p> |
|  | <p>Incontinence</p>    | <p>“Yes ma'am, you know we sometimes have to go run to the bathroom, you know. You eat something that go right through ya [when asked if affects her ability to shop or eat] Yes, ma'am...When you get food or something, you get the wrong eatin habit with with somebody, you know, kind of food, you want to eat it come right through ya.”</p> <p>“I have no control over my urine issues. That's long been gone, and I don't take anything for it. I think I'd ask the nurse sometimes or doctor about it, but I just don't.”</p>  |



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|  |  | "I gotta wait to clear it up first [urinary and bowel issues] before I go shopping. Yeah, yes ma'am, go shopping and everything going to eat, to pick up something, you know, you gotta wait and see what's going on in your body." |
|--|--|---|

**Table 3.** *Older Adult Food Insecurity Scale (OAFIS), corresponding ICF component, and food security domains.*

| ICF component         | Major Themes       | Subthemes                            | Food insecurity survey items:   | Food security Domain   |
|-----------------------|--------------------|--------------------------------------|---|--|
| Environmental factors | Transportation     | Public transportation                | 1. Do you use public transportation to buy food and/or groceries?   | Access   |
|                       |                    | Driving limitations                  | 2. Are you able to easily get to the grocery store to buy food?   | Access   |
|                       |                    |                                      | 3. How long does it take for you to get to the store to buy food?   | Access   |
|                       |                    |                                      | 4. Are you able to get to the store to buy food as often as you need to?  | Availability   |
|                       | Access/<br>Variety | Lack of financial resources          | 5. In the last year, have you ever run out of money to buy food and/or groceries?                                   | Access   |
|                       |                    | Lack of access to a variety of foods | 6. In the last year, have you always had access to a variety of foods, such as fresh fruit, vegetables, meat, etc.? | Availability and Stability   |
|                       |                    |                                      | 7. In the last year, have you ever worried about not having access to enough food?                                  | Availability and Stability   |
|                       | Housing            | Exterior housing issues              | 8. Do you have any issues carrying your groceries from your mode of transportation to your housing?                 | Access   |
|                       |                    | Interior housing issues              | 9. Do you have access to enough space and working appliances to store, prepare, and heat your food?                 | Access   |
|                       | Activity           | Mobility & aging                     | Pain  | 10. Do you have chronic pain that makes it harder to shop, prepare, or eat food? |
| Aging & frailty       |                    |                                      | 11. Do you have any issues walking or standing that make it harder to shop or prepare food?                         | Access and Utilization   |

|                              |                                       |   |  |                        |
|------------------------------|---------------------------------------|---|--|------------------------|
|                              |                                       | Difficulty carrying/lifting   | 12. Do you have any issues lifting or carrying items that may limit your ability to shop for food or prepare food?                               | Access and Utilization |
|                              |                                       | Challenges associated with assistive equipment  | 13. Do you need or use any assistive equipment (e.g., walker, wheelchair, rollator, scooter, etc.)?  | Access and Utilization |
|                              |                                       |   | 14. If yes, how does the use of/need for assistive equipment affect your ability to shop for food or prepare food?                               | Access and Utilization |
| Personal/<br>Participation   | Preparing food                        | Challenges with preparing meals   | 15. Do you ever lack energy or desire to shop for food or prepare food?  | Access and Utilization |
|                              | Interpersonal relationship            | Predictive or lack of interpersonal relationships/<br>Protective interpersonal relationships and helping others | 16. Do you have family, friends, or other resources that help with food pick up or meals?  | Access and Utilization |
|                              |                                       |   | 17. Are you a caregiver?   | Access and Utilization |
|                              |                                       |   | 18. If yes, does acting as a caregiver ever make it harder to access or buy enough food?   | Access and Utilization |
|                              | Food assistance                       | Food assistance support – positive and negative aspects   | 19. Are you receiving any nutrition or food assistance?  | Access                 |
|                              |                                       |   | 20. If yes, do you ever run out of food assistance benefits before you are able to get more?   | Stability              |
| Body Functions/<br>Structure | Dentition/<br>ingestion/<br>digestion | Dental issues   | 21. Do you have any problems chewing food?   | Access and Utilization |
|                              |                                       | Difficulty swallowing & Digestion   | 22. Do you have any swallowing or digestive issues that make it harder to eat?   | Access and Utilization |
|                              |                                       | Lack of appetite  | 23. Do you ever experience poor appetite?  | Access and Utilization |
|                              | Health conditions                     | Chronic conditions  | 24. Do you have any chronic conditions (e.g., diabetes, high blood pressure, etc.) or take any medications that require you to change your diet? | Access and Utilization |
|                              |                                       |   | 25. If yes, does/do this/these condition(s) or medication(s) make it harder to buy or prepare food?  | Access and Utilization |

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|  |  | Mental Health   | 26. Included in questions "challenges associated with preparing meals' and "lack of appetite"      | Access and Utilization |
|  |  | Memory concerns | 27. Do you have any memory problems that affect your ability to shop for food or prepare food?     | Access and Utilization |
|  |  | Incontinence    | 28. Do you experience any incontinence that affects your ability to shop for food or prepare food? | Access and Utilization |

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