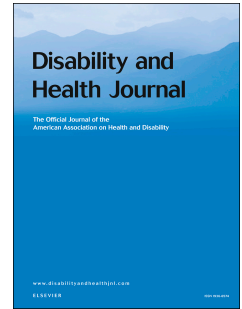


Journal Pre-proof



Food insecurity gaps in the Supplemental Nutrition Assistance Program based on disability status

Laura J. Samuel, PhD, RN, Jiafeng Zhu, MS, Pallavi Dwivedi, MPH, MS, Elizabeth A. Stuart, PhD, Sarah L. Szanton, PhD, RN, Qiwei Li, PhD, Roland J. Thorpe, Jr., PhD, Nicholas S. Reed, AuD, Bonnielin K. Swenor, PhD, MPH

PII: S1936-6574(23)00053-5

DOI: <https://doi.org/10.1016/j.dhjo.2023.101486>

Reference: DHJO 101486

To appear in: *Disability and Health Journal*

Received Date: 7 February 2023

Revised Date: 23 May 2023

Accepted Date: 28 May 2023

Please cite this article as: Samuel LJ, Zhu J, Dwivedi P, Stuart EA, Szanton SL, Li Q, Thorpe RJ, Reed NS, Swenor BK, Food insecurity gaps in the Supplemental Nutrition Assistance Program based on disability status, *Disability and Health Journal*, <https://doi.org/10.1016/j.dhjo.2023.101486>.

This is a PDF file of an article that has undergone enhancements after acceptance, such as the addition of a cover page and metadata, and formatting for readability, but it is not yet the definitive version of record. This version will undergo additional copyediting, typesetting and review before it is published in its final form, but we are providing this version to give early visibility of the article. Please note that, during the production process, errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

© 2023 Elsevier Inc. All rights reserved.

Food insecurity gaps in the Supplemental Nutrition Assistance Program based on disability status

Authors:

Laura J. Samuel, PhD, RN*; Johns Hopkins School of Nursing; lsamuel@jhmi.edu

Jiafeng Zhu, MS; Bloomberg School of Public Health; jzhu70@jhu.edu

Pallavi Dwivedi, MPH, MS; Johns Hopkins School of Nursing; pdwived2@jhmi.edu

Elizabeth A. Stuart, PhD; Bloomberg School of Public Health; estuart@jhu.edu

Sarah L. Szanton, PhD, RN; Johns Hopkins School of Nursing, Public Health, and Medicine;
sarah.szanton@jhu.edu

Qiwei Li, PhD Johns Hopkins School of Nursing; qli84@jh.edu

Roland J. Thorpe, Jr., PhD; Bloomberg School of Public Health; rthorpe@jhu.edu

Nicholas S. Reed, AuD; Bloomberg School of Public Health; nreed9@jhmi.edu

Bonnielin K. Swenor, PhD, MPH; The Johns Hopkins Disability Health Research Center, Johns
Hopkins School of Nursing; bswenor@jhmi.edu

* Corresponding author

410-502-7170

525 North Wolfe St., Rm 409

Baltimore, MD 21210

Word count: 3598

Abstract word count: 250

1 Figure

3 Tables

51 references

Keywords: Food assistance, food security, disability, socioeconomic factors, health equity

Disclosures:

Conflicts of Interest: The authors have no conflicts of interest to disclose.

Funding: Funding for this work was provided by the Johns Hopkins University Discovery Award. LJS was supported by the National Institute on Aging (K01AG054751). RJT was supported by the National Institute on Aging (K02AG059140) and the National Institute on Minority Health and Health Disparities (U54MD000214). NSR was supported by the National Institute on Aging (K23AG065443).

- 1 Food insecurity gaps in the Supplemental Nutrition Assistance Program based on disability status
- 2

Journal Pre-proof

3 Abstract

4 Background

5 Households including someone with disabilities experience disproportionately high food
6 insecurity rates and likely face disproportionate barriers accessing Supplemental Nutrition
7 Assistance Program (SNAP) benefits.

8 Objective

9 Examine the role of SNAP with regard to food insecurity disparities based on disability status.

10 Methods

11 Modified Poisson regression models examined food insecurity risk based on disability status
12 (household includes no one with disabilities vs. those with work-limiting disabilities or non-
13 work-limiting disabilities) among 2018 Survey of Income and Program Participation households
14 eligible for SNAP (income \leq 130% of the poverty threshold). Weighted estimates were used to
15 account for the study design and non-response.

16 Results

17 Households including someone with work-limiting disabilities were more than twice as likely to
18 be food insecure than households including no one with disabilities (PR=2.16, 95% CI: 1.90,
19 2.45); households including someone with non-work-limiting disabilities were 65% more likely
20 (PR=1.65, 95% CI: 1.39, 1.95). However, disparities were more pronounced among households
21 not participating in SNAP (PR=2.67, 95% CI: 2.22, 3.23 for work-limiting disabilities and
22 PR=1.86, 95% CI: 1.44, 2.40 for non-work-limiting disabilities) than SNAP-participating
23 households (PR=1.71, 95% CI: 1.45, 2.03 and PR=1.46, 95% CI: 1.17, 1.82, respectively).

24 Approximately 4.2 million low-income U.S. households including someone with disabilities are

25 food insecure. Of these, 1.4 million were not participating in SNAP and another 2.8 million
26 households were food insecure despite participating in SNAP.

27 Conclusions

28 Access to SNAP benefits is not proportionate to the scale of food insecurity among households
29 that include people with disabilities. Action is needed to strengthen food assistance for those
30 with disabilities.

31

32 Keywords: Food assistance, food security, disability, socioeconomic factors, health equity

33

Journal Pre-proof

34 **Introduction**

35 About 67 million American adults have a disability, defined as serious difficulty in activities of
36 daily life.¹ National data show that food insecurity rates are up to three times higher among
37 people with any disabilities compared to those without,^{2,3} meaning that they have limited or
38 uncertain access to adequate food.⁴ Although the food insecurity rate declined in the U.S.
39 population from 15% in 2011 to 10% in 2021,⁵ the food insecurity rate did not decline among
40 households that included someone with disabilities⁶ and people with disabilities were twice as
41 likely to have insufficient food than those without disabilities during the COVID-19 pandemic.⁷
42 Importantly, food insecurity is associated with numerous health outcomes among adults,
43 including poorer dietary quality,^{8,9} glycemic control,¹⁰⁻¹³ and overall health,^{14,15} a higher risk of
44 hypertension, high cholesterol,¹⁶ diabetes,¹⁷ cost-related medication non-adherence,¹⁸ functional
45 limitations,^{19,20} mobility decline,²⁰ and COVID-19,²¹ and associated with greater healthcare
46 expenditures,²² and earlier mortality²³ and associated with poorer health and higher risk of
47 hospitalization among adults with disabilities.¹⁵ Therefore, disability-based disparities in food
48 insecurity may partly account for the health disparities that have been documented based on
49 disability status.^{24,25} Together, this evidence highlights the urgency of addressing food insecurity
50 for people with disabilities.

51

52 The Supplemental Nutrition Assistance Program (SNAP) provides money for food to low-
53 income households and participation in the program is estimated to reduce food insecurity by
54 30%.^{26,27} Based on federal guidelines, individuals with incomes \leq 130% of the poverty threshold
55 are eligible for the program. Although states administer the program and are allowed to increase
56 the income eligibility limit, only about 6% of SNAP households have incomes above that

57 threshold.²⁸ This is likely because households with incomes $\leq 130\%$ of the poverty threshold are
58 six times more likely to experience food insecurity than households with incomes $\geq 185\%$ of the
59 poverty threshold⁵ and food insecurity is a predictor of SNAP enrollment.²⁹

60

61 Importantly, people with disabilities may face barriers to SNAP that are not experienced by
62 people without disabilities. Although the SNAP program has eligibility rules for people with
63 disabilities, SNAP defines disability based solely on receipt of disability benefits, which has a
64 laborious application process and a one-year wait time.³⁰ More than half of U.S. adults with
65 disabilities are employed¹ and therefore likely don't apply for disability benefits. In addition,
66 people with disabilities may face challenges in SNAP enrollment as this cumbersome process is
67 often not accessible.³¹ People with disabilities also face procedural loop holes, as these
68 individuals may not be able to stay enrolled in SNAP for more than 3 months if they are
69 classified by SNAP as an 'able bodied adult without dependents' during waiting periods for
70 disability benefit applications, or may not receive the maximum benefit amount to which they
71 are entitled if they are unable to produce documentation of income, assets, medical expenses
72 and/or housing expenses. Together, these issues likely contribute to barriers to SNAP access for
73 households that include someone with disabilities, but are under-studied aspects.

74

75 To fill these knowledge gaps, this study tested two hypotheses among U.S. households who were
76 income-eligible for SNAP. First, we tested the hypothesis that the risk of being food insecure and
77 not participating in SNAP is higher among households that include someone with disabilities
78 than households that do not include anyone with disabilities. Second, because of SNAP's strict
79 disability definition, we hypothesized whether SNAP participating households that include

80 someone with disabilities have disproportionately lower benefit amounts or shorter duration of
81 benefits than households that do not include someone with disabilities. We further hypothesized
82 these results by disability categories, comparing those with a work-limiting disability and those
83 with a non-work-limiting disability.

84

85

Journal Pre-proof

86 **Methods**

87 *Study design and sample*

88 The Survey of Income and Program Participation (SIPP) provides representative household-level
89 U.S. data collected during face-to-face interviews and is described in detail elsewhere.³² The
90 current study used data from the January 2018 SIPP survey, which is the most recent year of
91 complete data prior to the pandemic. Of the 44,870 eligible households, 26,215 participated in
92 interviews (58.4% response rate). The unit of analysis is households rather than individuals since
93 food insecurity and SNAP utilization are both measured at the household level. This study
94 included 4,946 households with incomes $\leq 130\%$ of the federal poverty threshold, based on
95 federal SNAP eligibility criteria.

96

97 *Key Measures*

98 Key variables for this study are disability status, food insecurity and SNAP utilization. As in
99 prior work,¹ households were classified as having someone with a work-limiting disability if
100 anyone 15 years of age or older reported having a “physical, mental or other health condition that
101 limits the kind or amount of work he/she can do”. The remaining households were classified as
102 having someone with a ‘non-work-limiting disability’ if any adult or child member had “serious
103 difficulty” hearing or seeing, or with “walking or climbing stairs”, “lifting or carrying something
104 as heavy as 10 pounds”, “concentrating, remembering, or making decisions” or “dressing or
105 bathing”. The classification of no disability was determined if none of the household members
106 reported difficulty in any of the six functional domains. Because SNAP has a narrower definition
107 of disability based on receipt of disability benefits, this study also described the households that
108 received “income due to a disability or health condition”; this data was collected among those

109 who reported a work-limiting disability and were between 15 and 69 years of age. Household
110 food insecurity status was classified using the validated six-item USDA Food Security Survey
111 Module.³³ SNAP participation was classified based on whether anyone in the household reported
112 that the household received SNAP benefits over the past 12 months. Among SNAP participating
113 households, benefit duration was measured as the number of months of benefits received during
114 the past year. Benefit amounts were calculated in two ways among households that received
115 SNAP benefits during the survey month; total household benefit amount accounted for
116 economies of scale and per-person benefit amount, calculated by dividing the benefit amount by
117 the total number of people in the household during the month, accounted for household size.

118

119 *Additional household characteristics*

120 Since SNAP eligibility depends partly on the presence of children <18 years or older adults ≥ 60
121 years in the household, household indicators (yes/no) for presence of children and presence of
122 older adults were both reported. Variables that may be associated with both disability status and
123 SNAP participation were measured in this study. These included the racial composition of the
124 household (entirely White (ref.), entirely Black, entirely Asian and multiple race
125 households/multi-race individuals in household), the ethnic composition (entirely non-Hispanic
126 (ref.), entirely-Hispanic, or both), number of adults in the household (1, 2 or ≥ 3), U.S. region
127 (Northeast, Midwest, South and West), and immigration status (all born in the U.S. (ref.), all
128 born outside the U.S., or a mixture of the two). Since SNAP benefit amounts depend partly on
129 household income, we also described the total monthly household income.

130

131 *Statistical analyses*

132 The combined probability of food insecurity and SNAP participation was estimated for each
133 disability category. Due to observed racial, ethnic, age and geographic disparities in both food
134 insecurity and disability status ^{1,34-36}, we additionally examined differences in results across race,
135 ethnicity, and geographic region. Modified Poisson regression models , which are recommended
136 for commonly-occurring binary outcomes,³⁷ were used to estimate the prevalence of food
137 insecurity, comparing racial groups. Regression models adjusted for all additional household
138 characteristics. To evaluate whether SNAP participation is related to racial disparities in food
139 insecurity, regression models were stratified by SNAP participation and results were compared
140 across groups. Additional analyses compared SNAP duration and benefit amounts based on
141 disability status, among households that received SNAP in the past year, and the past month,
142 respectively using ANOVA. Household-level sampling weights were applied to all analyses so
143 that inferences could be drawn to all U.S. households and variance estimates account for the
144 complex survey design. Analyses were conducted in R version 4.2.2.

145

146

147 Results

148 Overall, 26% of all households with incomes $\leq 130\%$ of the poverty threshold were food insecure
149 and 41% participated in SNAP (Table 1). Approximately 40% of households with incomes
150 $\leq 130\%$ of the poverty threshold contained an individual with a work-limiting disability, which
151 translates to about 9.4 million households. Another 12% of households included an individual
152 with disabilities who is not limited in work, translating to almost 3 million households. Although
153 households that included someone with either a work-limiting or non-work-limiting disability
154 were more likely ($p < 0.001$) to participate in SNAP (56% and 38%, respectively) than households
155 that did not contain anyone with disabilities (28%), they were also more likely ($p < 0.001$) to
156 experience food insecurity (36% and 26% vs 17%, respectively) (Table 1).

157

158 Other household characteristics also differed based on disability status. Compared to households
159 with no disability, households that included someone with any disability were more likely to
160 have two adults and at least one older adult and had higher average monthly income (Table 1).

161 Compared to those with a work-limiting disability, households in the non-work-limiting
162 disability group were more likely to include individuals who were White and Hispanic or have
163 members who were immigrants or children (Table 1). Only 6% of households with a work-
164 limiting disability received disability benefits.

165

166 In unadjusted comparisons, disability-based disparities in food insecurity were found both among
167 households that did and did not participate in SNAP (Figure 1). The percentages of households
168 that were food insecure and not participating in SNAP were 22% and 33% higher, respectively,
169 among households that included someone with a work-limiting and non-work-limiting disability

170 compared with no disability (percentages were 11% and 12%, respectively vs. 9% for
171 households including no one with a disability). These rates translate into over 1 million food
172 insecure households not participating in SNAP in the work-limiting disability group and over
173 335,000 households in the non-work-limiting disability group. Additionally, households that
174 include someone with either a work-limiting disability or non-work-limiting disability are three-
175 times more likely and 75% more likely, respectively, to be food insecure while receiving SNAP
176 than households without anyone with disabilities. One quarter of households that include
177 someone with a work-limiting disability are food insecure while receiving SNAP and 14% of
178 households in the non-work-limiting disability group meet those criteria; these rates translate into
179 over 2.3 million and 400,000 households, respectively. Similar results were found in additional
180 analyses that examined these patterns across racial subgroups, ethnic subgroups, age subgroups,
181 and regional subgroups (Supplement 1).

182
183 Adjusting for SNAP participation and additional household characteristics, households that
184 included someone with a work-limiting disability were more than twice as likely (PR=2.16, 95%
185 CI: 1.90, 2.45) and households that included someone with a non-work-limiting disability were 65%
186 more likely (PR=1.65, 95% CI: 1.39, 1.95) to be food insecure than households that did not
187 include someone with disabilities (Table 2). The confidence interval for the non-work-limiting
188 disability group overlaps the confidence interval for the work-limiting disability group, showing
189 that the two disability subgroups have similar food insecurity risk (Table 2). However, the food
190 insecurity disparities based on disability were more pronounced among households that did not
191 participate in SNAP than among households that had participated in SNAP over the past year.
192 Having someone with work-limiting disabilities in the household was associated with greater

193 than a two-fold higher risk of food insecurity than having no one with disabilities among those
194 not participating in SNAP (PR=2.67, 95% CI: 2.22, 3.23) but less than a two-fold higher risk
195 among households that had participated in SNAP (PR=1.71, 95% CI: 1.45, 2.03) (Table 2).

196 Likewise, having someone in the household with a non-work-limiting disability was associated
197 with an 86% higher risk of food insecurity than having no one with disabilities among
198 households that had not participated in SNAP (PR=1.86, 95% CI: 1.44, 2.40), but only a 46%
199 higher risk among households that had participated in SNAP (PR=1.46, 95% CI: 1.17, 1.82)
200 (Table 2). Results were similar when comparing households including someone with any
201 disabilities to households without anyone with disabilities (Supplemental Table 1).

202

203 Among those participating in SNAP, households that included someone with a work-limiting
204 disability tended to receive SNAP benefits for a longer duration of the year (mean months =
205 11.34) than households that included either those with a non-work-limiting disability (mean
206 months = 10.52) or no disability (mean months = 10.52) (Table 3). Among households that
207 received SNAP during the survey month, those that did not include someone with a disability
208 had higher average total household benefits (\$316) than households that included someone with
209 either a work-limiting disability (\$187) or a non-work-limiting disability (\$256) but the per-
210 person benefit amounts were not statistically significantly different (\$112, \$106, and \$109,
211 respectively).

212

213

214 Discussion

215 These findings are consistent with those from other studies in documenting food insecurity
216 disparities based on disability status^{2,3,7,38} and builds on prior work by considering SNAP
217 participation. Importantly, food insecurity disparities occur regardless of whether or not the
218 person with disabilities is able to work. Although the disparities are more pronounced among
219 households that have not participated in SNAP in the past year, it is notable that disparities also
220 exist among SNAP participating households. Although households that include a person with
221 disabilities are more likely to participate in SNAP, this study estimates that 4.2 million low-
222 income households that include someone with disabilities are food insecure. These results
223 suggest that efforts to strengthen SNAP must be re-examined to close these gaps. These results
224 provide evidence for developing disability-inclusive SNAP policy(ies) to improve SNAP access.

225
226 There are potential reasons for these study findings. First, there is good evidence that SNAP
227 enrollment can reduce food insecurity,^{26,27} and this may account for the relatively attenuated
228 disparities in food insecurity among SNAP participating households in this study. However, it is
229 also possible that the households with more resources and support are more successful at
230 enrolling in SNAP. The SNAP enrollment process is cumbersome and there is evidence of
231 accessibility gaps in the SNAP enrollment process,³¹ which likely disproportionately affects
232 individuals with disabilities. This study estimates that 2.8 million households including someone
233 with disabilities continue to be food insecure while receiving SNAP benefits and found
234 disability-based food insecurity disparities among SNAP-participating households. These
235 findings suggests that SNAP enrollment alone may not be sufficient to address the food
236 insecurity burden among low income households that include someone with a disability.

237

238 There are two potential reasons why SNAP benefits may be insufficient among households that
239 include someone with disabilities. First, individuals with disabilities have a higher cost of living
240 than their peers due to the high costs of additional resources needed to complete daily tasks, such
241 as meal preparation, food shopping, and transportation and personal assistance services.³⁹ People
242 with disabilities may also need costlier food due to dietary restrictions or specialized diets.

243 Therefore, it is possible that SNAP benefit amounts are not adequate to ensure food security for
244 households that include someone with a disability. Second, these results may be due to
245 challenges faced in meeting competing basic needs. Multiple aspects of financial strain,
246 including housing cost-burden, cost-related treatment delays/medication non-adherence and food
247 insecurity tend to co-occur among low-income households⁴⁰ and individuals with disabilities
248 have higher rates of each.^{2,41,42} Importantly, there is evidence that low-income households face
249 difficult trade-off decisions and compromise basic needs when faced with multiple financial
250 needs.⁴³ Greater attention may be needed in addressing other unmet needs for low-income
251 individuals with disabilities to limit trade-off decisions between food and other basic needs.

252

253 These results are timely because individuals with disability have faced greater risk of food
254 insecurity than their peers during the COVID-19 pandemic.⁷ In addition, rates of food insecurity
255 have been rising over the past two decades among older adults, including many with
256 disabilities.⁴⁴ This study shows a link between disability and food insecurity that preceded the
257 pandemic. Additional work is needed to understand if the conditions during the COVID-19
258 pandemic have worsened disparities. In addition, food assistance programs such as SNAP were

259 greatly expanded during the pandemic and new initiatives such as online SNAP were initiated
260 and the effect of these initiatives on food insecurity disparities should be examined.

261

262 *Limitations*

263 This cross-sectional study is not intended to draw causal inferences. SNAP participation may be
264 under-reported,⁴⁵ but the SIPP study is designed partly to track SNAP participation and there is
265 no reason to think that reporting bias would differ across disability groups. Also, this study
266 examined households with incomes $\leq 130\%$ of the poverty threshold based on federal SNAP
267 eligibility limits. Although some states using broad-based categorical eligibility options allow
268 households with incomes up to 200% of the poverty threshold to enroll in SNAP if they include
269 an older adult and/or person with a disability, only about 6% of SNAP participants have incomes
270 over the federal limit.²⁸ Therefore, results from this study are not intended to be generalized to all
271 households that may receive SNAP, but just those that are eligible in all states. Finally, although
272 the SIPP sample is nationally representative, the study may not have fully inclusive processes for
273 enrollment and data collection. Therefore, the sample may not be representative of all
274 community-dwelling individuals with disabilities in the U.S.. Limitations in the SIPP questions
275 to assess disability must also be considered. Currently, the questions assessing work implications
276 among people with disabilities ask about “physical, mental or other health condition that limits
277 the kind or amount of work he/she can do”. This narrow phrasing may result in underestimates
278 and it promote ableist views that it is someone’s disability that limits their work status and not
279 structural ableism or lack of accessibility that prohibits work. Additionally, the six functional
280 questions assessing disability, including hearing, seeing, cognition, ambulation, self-care or
281 independent living, may exclude people with learning, psychological and intellectual and

282 developmental disabilities.⁴⁶ While these six questions are the standard approach to assessing
283 disability in national surveys, this limitation likely results in underestimates. Together, the
284 limitations in the questions assessing disability likely result in conservative or underestimates of
285 food insecurity and SNAP participation among households that include someone with
286 disabilities.

287

288 *Implications*

289 These results have several implications for policy and public health practice. First, the
290 cumbersome SNAP enrollment process is likely a barrier to food assistance among individuals
291 with disabilities³¹ and steps could be taken to streamline or even eliminate the enrollment process
292 altogether for some of them. For example, the Combined Application Project, which is used in
293 18 states, dramatically streamlines the enrollment process for individuals receiving Supplemental
294 Security Income.⁴⁷ Importantly, all individuals receiving Supplemental Security Income are
295 likely income-eligible for SNAP and 86% of these individuals have a disability.⁴⁸ Also,
296 programs that provide outreach and public benefit enrollment assistance increase SNAP
297 utilization in other populations⁴⁹ and research is needed to test these services among individuals
298 with a disability.

299

300 These results also demonstrate that the food insecurity disparities based on disability status do
301 not depend on whether the individual with disabilities is limited in their ability to work. This
302 finding is important because the SNAP program tries to distinguish people who are ‘able-bodied’
303 from those with disabilities and imposes additional work requirements and limited benefits for
304 individuals without dependents who are classified by the program as ‘able-bodied’. However,

305 these results demonstrate that all households that include someone with disabilities have elevated
306 risk for food insecurity, regardless of whether the person with disabilities is able to work. These
307 findings suggest that the working status distinction is meaningless with regard to food insecurity
308 risk for people with disabilities. Greater attention should be paid to SNAP program work
309 requirements to evaluate their role in shaping food insecurity disparities.

310

311 These results also suggest there is a need for policy action and advocacy to increase routine
312 clinical food insecurity screening and greater efforts to address food insecurity for people with
313 disabilities. The relatively high rates of food insecurity among households that include people
314 with disabilities and on SNAP, and this study suggests that SNAP enrollment alone is not
315 sufficient to meet food needs for these households. At least three additional actions are needed.
316 First, other unmet needs may need to be addressed for people with disabilities and their
317 households, such as housing insecurity or cost-related treatment delays so that households are not
318 forced to make trade-off decisions. Second, policy makers should ensure that allotted SNAP
319 benefit amounts are adequate for households that include someone with disabilities. SNAP
320 benefits were recently increased to reflect updated food prices based on the Thrifty Food Plan,⁵⁰
321 but this may not be sufficient for households that include someone with a disability. SNAP
322 benefit amounts are currently calculated based on household income and household size.
323 Therefore, the lack of differences in per-person SNAP benefit amounts across groups in this
324 study is due to the way benefit amounts are determined by the program. However, further work
325 is needed to estimate the food costs for households that include someone with a disability. Third,
326 the definition of disability used in the eligibility criteria for SNAP and other federal programs
327 should be reconsidered. Although the SNAP program has specific eligibility rules for young and

328 middle-aged adults receiving disability benefits, only about 6% of the households in the work-
329 limiting disability group in this study would likely meet this SNAP disability definition based on
330 receipt of disability benefits. Findings in this study showing relatively higher rates of food
331 insecurity based on self-reported disability status suggest that the current approach used by
332 SNAP to classify disability based on receipt of disability benefits is inadequate to identify
333 households in need of food assistance. Instead, these results suggest that disability should be
334 classified based on self-reported difficulty in at least one of six functional domains, as
335 recommended by the U.S. Department of Health and Human Services.⁵¹

336 **Conclusions**

337 This study found that SNAP participation and SNAP benefit amounts are not proportionate to the
338 food insecurity burden among people with disabilities. Policy action is needed to advance equity
339 by improving access to food assistance for this population.

340

Journal Pre-proof

341 Figure 1
342 Estimated counts and rates of food insecurity and Supplemental Nutrition Assistance Program
343 (SNAP) participation based on disability status among all households likely eligible for SNAP
344 (incomes $\leq 130\%$ of the poverty threshold) participating in the 2018 Survey of Income and
345 Program Participation. The joint probabilities of SNAP participation and food insecurity differ
346 across disability groups ($p < 0.001$). Work-limiting disability status was classified if a household
347 member was 15 years of age or older and reported work limitation(s). Among the remaining
348 households, non-work-limiting disability status was classified presence of household member(s)
349 reporting difficulty in at least one of six functional domains. Household sampling weights were
350 applied so that inferences can be drawn to U.S. households in 2018 and variance estimates
351 account for the complex survey design.

352

353

References

1. Varadaraj V, Deal JA, Campanile J, Reed NS, Swenor BK. National Prevalence of Disability and Disability Types Among Adults in the US, 2019. *Jama Netw Open*. Oct 21 2021;4(10)doi:ARTN e2130358

10.1001/jamanetworkopen.2021.30358
2. Coleman-Jensen A. U.S food insecurity and population trends with a focus on adults with disabilities. *Physiol Behav*. Jun 1 2020;220doi:ARTN 112865

10.1016/j.physbeh.2020.112865
3. Brucker DL, Coleman-Jensen A. Food Insecurity Across the Adult Life Span for Persons With Disabilities. *J Disabil Policy Stu*. Sep 2017;28(2):109-118.

doi:10.1177/1044207317710701
4. Bickel G, Nord M, Price C, Hamilton W, Cook J. *Guide to Measuring Household Food Security*. 2000. Accessed March 7, 2021. <https://naldc.nal.usda.gov/download/38369/PDF>
5. Coleman-Jensen A, Rabbitt MP, Gregory CA, Singh A. *Household Food Security in the United States in 2021*. 2022.
6. Coleman-Jensen A. US food insecurity and population trends with a focus on adults with disabilities. *Physiology & behavior*. 2020;220:112865.
7. Assi L, Deal JA, Samuel L, Reed NS, Ehrlich JR, Swenor BK. Access to food and health care during the COVID-19 pandemic by disability status in the United States. *Disabil Health J*. Jan 19 2022:101271. doi:10.1016/j.dhjo.2022.101271
8. Leung CW, Epel ES, Ritchie LD, Crawford PB, Laraia BA. Food insecurity is inversely associated with diet quality of lower-income adults. *J Acad Nutr Diet*. Dec 2014;114(12):1943-53 e2. doi:10.1016/j.jand.2014.06.353

9. Leung CW, Wolfson JA. Food Insecurity Among Older Adults: 10-Year National Trends and Associations with Diet Quality. *Journal of the American Geriatrics Society*. Apr 2021;69(4):964-971. doi:10.1111/jgs.16971
10. Basu S, Berkowitz SA, Seligman H. The Monthly Cycle of Hypoglycemia An Observational Claims-based Study of Emergency Room Visits, Hospital Admissions, and Costs in a Commercially Insured Population. *Medical Care*. Jul 2017;55(7):639-645. doi:10.1097/Mlr.0000000000000728
11. Seligman HK, Bolger AF, Guzman D, Lopez A, Bibbins-Domingo K. Exhaustion of food budgets at month's end and hospital admissions for hypoglycemia. *Health Aff (Millwood)*. Jan 2014;33(1):116-23. doi:10.1377/hlthaff.2013.0096
12. Seligman HK, Davis TC, Schillinger D, Wolf MS. Food insecurity is associated with hypoglycemia and poor diabetes self-management in a low-income sample with diabetes. *J Health Care Poor Underserved*. Nov 2010;21(4):1227-33. doi:10.1353/hpu.2010.0921
13. Seligman HK, Jacobs EA, Lopez A, Tschann J, Fernandez A. Food insecurity and glycemic control among low-income patients with type 2 diabetes. *Diabetes Care*. Feb 2012;35(2):233-8. doi:10.2337/dc11-1627
14. Leung CW, Kullgren JT, Malani PN, et al. Food insecurity is associated with multiple chronic conditions and physical health status among older US adults. *Prev Med Rep*. Dec 2020;20:101211. doi:10.1016/j.pmedr.2020.101211
15. Brucker DL. The association of food insecurity with health outcomes for adults with disabilities. *Disability and Health Journal*. Apr 2017;10(2):286-293. doi:10.1016/j.dhjo.2016.12.006

16. Seligman HK, Laraia BA, Kushel MB. Food insecurity is associated with chronic disease among low-income NHANES participants. *J Nutr.* Feb 2010;140(2):304-10.
doi:10.3945/jn.109.112573
17. Seligman HK, Bindman AB, Vittinghoff E, Kanaya AM, Kushel MB. Food insecurity is associated with diabetes mellitus: results from the National Health Examination and Nutrition Examination Survey (NHANES) 1999-2002. *J Gen Intern Med.* Jul 2007;22(7):1018-23.
doi:10.1007/s11606-007-0192-6
18. Wilder ME, Kulie P, Jensen C, et al. The Impact of Social Determinants of Health on Medication Adherence: a Systematic Review and Meta-analysis. *Journal of General Internal Medicine.* May 2021;36(5):1359-1370. doi:10.1007/s11606-020-06447-0
19. Gundersen C, Ziliak JP. Food Insecurity Research in the United States: Where We Have Been and Where We Need to Go. *Applied Economic Perspectives and Policy* 2018;40(1):119–135. doi:10.1093/aep/px058
20. Bishop NJ, Wang K. Food insecurity, comorbidity, and mobility limitations among older US adults: Findings from the Health and Retirement Study and Health Care and Nutrition Study. *Preventive medicine.* 2018;114:180-187.
21. Choi SL, Men F. Food insecurity associated with higher COVID-19 infection in households with older adults. *Public Health.* Nov 2021;200:7-14.
doi:10.1016/j.puhe.2021.09.002
22. Berkowitz SA, Seligman HK, Meigs JB, Basu S. Food insecurity, healthcare utilization, and high cost: a longitudinal cohort study. *Am J Manag Care.* Sep 2018;24(9):399-404.

23. Gundersen C, Ziliak JP. Food Insecurity Research in the United States: Where We Have Been and Where We Need to Go. *Applied Economic Perspectives and Policy*. 2018;40(1):119-135. doi:10.1093/aep/px058
24. Horner-Johnson W, Dobbertin K, Lee JC, Andresen EM, Hlth EPD. Disparities in chronic conditions and health status by type of disability. *Disability and Health Journal*. Oct 2013;6(4):280-286. doi:10.1016/j.dhjo.2013.04.006
25. Reichard A, Stolzle H, Fox MH. Health disparities among adults with physical disabilities or cognitive limitations compared to individuals with no disabilities in the United States. *Disability and Health Journal*. Apr 2011;4(2):59-67. doi:10.1016/j.dhjo.2010.05.003
26. Ratcliffe C, McKernan SM, Zhang S. How Much Does the Supplemental Nutrition Assistance Program Reduce Food Insecurity? *Am J Agr Econ*. 2011;93(4):1082-1098. doi:10.1093/ajae/aar026
27. Gundersen C, Kreider B, Pepper JV. Partial Identification Methods for Evaluating Food Assistance Programs: A Case Study of the Causal Impact of Snap on Food Insecurity. *Am J Agr Econ*. Jul 2017;99(4):875-893. doi:10.1093/ajae/aax026
28. Congressional Research Service. *The Supplemental Nutrition Assistance Program (SNAP): Categorical Eligibility*. 2019. <https://fas.org/sgp/crs/misc/R42054.pdf>
29. Kreider B, Pepper JV, Gundersen C, Jolliffe D. Identifying the Effects of SNAP (Food Stamps) on Child Health Outcomes When Participation Is Endogenous and Misreported. *J Am Stat Assoc*. Sep 2012;107(499):958-975. doi:10.1080/01621459.2012.682828
30. Curda E. *Social Security Disability: Information on Wait Times, Bankruptcies, and Deaths among Applicants Who Appealed Benefit Denials*. 2020. Accessed November 14, 2022. <https://www.gao.gov/products/gao-20-641r>

31. Samuel LJ, Xiao E, Cerilli C, et al. The development of the Supplemental Nutrition Assistance Program enrollment accessibility (SNAP-access) score. *Disabil Health J*. Aug 6 2022;101366. doi:10.1016/j.dhjo.2022.101366
32. U.S. Census Bureau. *2018 Survey of Income and Program Participation Users' Guide*. 2021. Accessed October 14, 2021.
33. Blumberg SJ, Bialostosky K, Hamilton WL, Briefel RR. The effectiveness of a short form of the Household Food Security Scale. *Am J Public Health*. Aug 1999;89(8):1231-4.
34. Walker RJ, Garacci E, Dawson AZ, Williams JS, Ozieh M, Egede LE. Trends in Food Insecurity in the United States from 2011-2017: Disparities by Age, Sex, Race/Ethnicity, and Income. *Popul Health Manag*. Aug 2021;24(4):496-501. doi:10.1089/pop.2020.0123
35. Montez JK, Hayward MD, Wolf DA. Do US states' socioeconomic and policy contexts shape adult disability? *Social Science & Medicine*. Apr 2017;178:115-126. doi:10.1016/j.socscimed.2017.02.012
36. Leonard T, Hughes AE, Donegan C, Santillan A, Pruitt SL. Overlapping geographic clusters of food security and health: Where do social determinants and health outcomes converge in the U.S? *Ssm-Popul Hlth*. Aug 2018;5:160-170. doi:10.1016/j.ssmph.2018.06.006
37. Zou GY. A modified Poisson regression approach to prospective studies with binary data. *American Journal of Epidemiology*. Apr 1 2004;159(7):702-706. doi:10.1093/aje/kwh090
38. Heflin CM, Altman CE, Rodriguez LL. Food insecurity and disability in the United States. *Disability and Health Journal*. Apr 2019;12(2):220-226. doi:10.1016/j.dhjo.2018.09.006
39. Goodman N, Morris M, Boston K. *Financial Inequality: Disability, Race and Poverty in America*. 2019.

40. Berkowitz SA, Seligman HK, Choudhry NK. Treat or eat: food insecurity, cost-related medication underuse, and unmet needs. *Am J Med.* Apr 2014;127(4):303-310 e3.
doi:10.1016/j.amjmed.2014.01.002
41. Henning-Smith C. Where do community-dwelling older adults with disabilities live? Distribution of disability in the United States of America by household composition and housing type. *Ageing & Society.* Jul 2017;37(6):1227-1248. doi:10.1017/S0144686x16000210
42. Horner-Johnson W, Dobbertin K, Lee JC, Andresen EM, Dispa EPDH. Disparities in Health Care Access and Receipt of Preventive Services by Disability Type: Analysis of the Medical Expenditure Panel Survey. *Health Services Research.* Dec 2014;49(6):1980-1999.
doi:10.1111/1475-6773.12195
43. Samuel LJ, Wright R, Taylor J, Lavigne LCR, Szanton SL. Social Norms About Handling Financial Challenges in Relation to Health-Protective Capacity Among Low-Income Older Adults. *Gerontologist.* May 25 2022;doi:10.1093/geront/gnac061
44. Ziliak JP, Gundersen C. *The State of Senior Hunger in America 2018: An Annual Report.* 2020.
45. Meyer BD, Mittag N, Goerge RM. *Errors in survey reporting and imputation and their effects on estimates of food stamp program participation.* Vol. Working Paper 25143 2018.
Accessed 1/11/2019. <http://www.nber.org/papers/w25143>
46. Mitra M, Long-Bellil L, Moura I, Miles A, Kaye HS. Advancing Health Equity And Reducing Health Disparities For People With Disabilities In The United States. *Health Affair.* Oct 2022;41(10):1379-1386. doi:10.1377/hlthaff.2022.00499

47. Dorn S, Minton S, Huber E. *Examples of Promising Practices for Integrating and Coordinating Eligibility, Enrollment and Retention: Human Services and Health Programs Under the Affordable Care Act* 2014.
48. Center on Budget and Policy Priorities. *Policy Basics: Supplemental Security Income*. 2021. <https://www.cbpp.org/research/social-security/supplemental-security-income>
49. Finkelstein A, Notowidigdo MJ. Take-up and Targeting: Experimental Evidence from SNAP. *Q J Econ*. Aug 2019;134(3):1505-1556. doi:10.1093/qje/qjz013
50. US Department of Agriculture Food and Nutrition Service. *Thrifty Food Plan, 2021*. 2021. <https://FNS.usda.gov/TFP>
51. United States Department of Health and Human Services. *U.S Department of Health and Human Services Implementation Guidance on Data Collection Standards for Race, Ethnicity, Sex, Primary Language, and Disability Status*. 2011. Accessed March 23, 2022. https://aspe.hhs.gov/sites/default/files/migrated_legacy_files//43681/index.pdf

Table 1

Characteristics of households likely eligible for the Supplemental Nutrition Assistance Program (SNAP) (income \leq 130% of the poverty threshold) participating in the 2018 Survey of Income and Program Participation, overall and based on presence of an individual with disability (n=4974)

	Overall	No disability (n= 2210) (48%)	Work- limiting disability (n= 2127) (40%)	Non-work- limiting disability (n= 637) (12%)	P value
Food insecurity					
No	74	83	64	74	p<0.001
Yes	26	17	36	26	
SNAP participation					
No	59	72	44	62	p<0.001
Yes	41	28	56	38	
Receives disability benefits ^a					
No		N/A	76.0	N/A	
Yes			6.2		
Not applicable because age \geq 70			17.8		
Racial composition (%)					

White alone	65.5	64.3	65.7	69.1	<0.001
Black alone	21.6	21.9	22.5	17.3	
Asian alone	4.5	6.6	2.1	4.7	
Other racial groups/ Multi- racial	8.4	7.2	9.7	8.9	
Ethnicity (%)					
Hispanic alone	18.1	21.1	13.6	21.2	<0.001
Non-Hispanic alone	78.1	74.8	83.1	74.0	
Both	3.9	4.1	3.3	4.9	
U.S. Region (%)					
Northeast	17.3	16.1	19.3	15.3	0.016
Midwest	21.4	20.9	21.9	21.6	
South	41.5	41.4	41.3	43.0	
West	19.8	21.6	17.6	20.1	
Average number of adults in household					
0, 1	58.1	59.8	57.2	56.2	<0.001
2	32.4	28.8	34.9	34.7	
3+	9.5	11.3	7.9	9.2	
Children in the household (%)					
No	62.2	51.9	74.5	61.7	<0.001
Yes	37.8	48.1	25.6	38.3	

Household members Born in the US (%)					
No	10.5	12.5	7.3	12.8	<0.001
Yes	77.3	71.2	85.4	73.8	
Both	12.3	16.2	7.3	13.4	
Anyone in the household 60 years and over (%)					
No	66.4	82.2	51.4	55.1	<0.001
Yes	33.6	17.8	48.6	44.9	
Mean monthly household income (SE)	\$953 (27)	\$903 (44)	\$989 (37)	\$1022 (80)	<0.001

Note: Household sampling weights were applied so that inferences can be drawn to U.S.

households in 2018 and variance estimates account for the complex survey design. Chi-square tests were used to generate all p values.

^a Disability benefit data was only obtained in SIPP from people who reported a work-limiting disability and were aged 15 to 69 years.

Table 2

Adjusted household-level associations between disability status and food insecurity among households likely eligible for SNAP (incomes $\leq 130\%$ of the poverty threshold) participating in the 2018 Survey of Income and Program Participation (n=4974)

	Total Sample	Non-SNAP participating households (n=2,922)	SNAP participating households (n=2,052)
	Prevalence Ratio (PR) (95% CI)	PR (95% CI)	PR (95% CI)
Disability status			
No disability (ref.)			
Work-limiting disability	2.16 (1.90, 2.45)	2.67 (2.22, 3.23)	1.71 (1.45, 2.03)
Non-work-limiting disability	1.65 (1.39, 1.95)	1.86 (1.44, 2.40)	1.46 (1.17, 1.82)
Household racial composition			
All White (ref.)			
All Black	1.08 (0.95, 1.22)	1.54 (1.25, 1.89)	0.87 (0.75, 1.01)
All Asian	0.57 (0.37, 0.89)	0.68 (0.38, 1.21)	0.50 (0.25, 0.99)
Other racial groups/multi-racial	1.13 (0.96, 1.32)	1.33 (1.01, 1.75)	1.01 (0.84, 1.22)
Household ethnicity composition			
Hispanic alone (ref.)			
Non-Hispanic alone	0.89 (0.77, 1.03)	0.81 (0.63, 1.04)	1.00 (0.83, 1.20)
Both	1.24 (0.97, 1.59)	1.45 (0.97, 2.17)	1.13 (0.84, 1.53)
Anyone in the household 60 years and over			
No (ref.)			
Yes	0.64 (0.57, 0.71)	0.53 (0.43, 0.65)	0.71 (0.62, 0.81)
Children in the household			

No (ref.)			
Yes	1.08 (0.96, 1.21)	1.28 (1.05, 1.56)	0.92 (0.79, 1.06)
Household nativity			
All born outside US (ref.)			
All born in US	0.90 (0.72, 1.12)	0.98 (0.71, 1.35)	0.78 (0.57, 1.08)
Both	0.83 (0.68, 1.00)	0.74 (0.54, 1.01)	0.89 (0.70, 1.13)
Number of adults in the household			
≤1 (ref.)			
2	0.86 (0.77, 0.97)	0.76 (0.62, 0.92)	0.94 (0.82, 1.08)
≥3	0.87 (0.73, 1.04)	0.72 (0.53, 0.96)	1.02 (0.82, 1.27)
U.S. Region			
Midwest (ref.)			
Northeast	0.86 (0.72, 1.01)	0.75 (0.55, 1.04)	0.93 (0.77, 1.12)
South	1.06 (0.93, 1.20)	0.96 (0.77, 1.19)	1.11 (0.96, 1.29)
West	0.97 (0.83, 1.13)	0.87 (0.68, 1.12)	1.05 (0.87, 1.27)
SNAP participation			
No (ref.)			
Yes	1.73 (1.55, 1.93)		

Note: Estimates obtained from Poisson regression model with robust standard errors. Household food insecurity was measured using the six-item USDA Food Security Survey Module.⁹ Household sampling weights were applied so that inferences can be drawn to U.S. households in 2018 and variance estimates account for the complex survey design.

Table 3

Supplemental Nutrition Assistance Program (SNAP) utilization characteristics among SNAP participating households in the 2018 Survey of Income and Program Participation, overall and based on presence of an individual with disability (n=4974)

	Overall (n=2052)	No disability (n= 622)	Work- limiting (n= 1186)	Non-work- limiting disability (n= 244)	P value
Mean months of SNAP benefits among households that received SNAP in the past year (SE)	11.00 (0.06)	10.56 (0.13)	11.34 (0.07)	10.54 (0.20)	<0.001
Mean household SNAP benefit amount among households that received SNAP during the survey month (SE)	\$248.54 (3.95)	\$329.07 (7.19)	\$197.22 (4.52)	\$272.75 (11.96)	<0.001
Mean per-person SNAP benefit amount among households that received SNAP	\$106.40 (1.33)	\$109.55 (2.17)	\$104.74 (1.84)	\$105.68 (3.76)	0.165

during the survey					
month (SE)					

Note: Household sampling weights were applied so that inferences can be drawn to U.S.

households in 2018 and variance estimates account for the complex survey design.

Journal Pre-proof

