Changes in Material Hardship Preceding Entry into the Supplemental Security Income Program:
Evidence from the Survey of Income and Program Participation

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## Abstract

Not all eligible individuals seek benefits from means-tested social welfare programs, but the reasons behind this phenomenon are poorly understood. Evidence from studies of the Supplemental Nutrition Assistance Program suggests that beneficiaries may be those whose hardship levels rise shortly before applying for benefits. In this project, I embarked on a preliminary investigation into whether similar patterns exist for the Supplemental Security Income (SSI) program through use of data from the nationally representative Survey of Income and Program Participation. I found preliminary evidence to suggest that uninsurance and food insecurity rise for eventual SSI recipients as compared to eligible non-recipients prior to program entry. The information provided here may help in the development of policies that can alleviate vulnerabilities for people before they have a need for SSI benefits.

## Background

  The drivers of participation in means-tested social welfare programs are poorly understood. Not all eligible individuals or families seek benefits from these programs, and participation rates vary considerably from state to state. For example, the US Department of Agriculture (2015) estimates that 2012 Supplemental Nutrition Assistance Program (SNAP; formerly the Food Stamps Program) participation rates among eligible individuals ranged from 56% in Wyoming to nearly 100% in Oregon and Maine. This type of data is not collected as regularly for Supplemental Security Income (SSI) program, but one recent study estimated that SSI participation among working age people with disabilities ranged from 13% in Utah to 33% in New York (Ben-Shalom & Stapleton, 2014). Another inquiry found that 54% of those aged 70 or older who were eligible for SSI benefits actually received them (Davies, 2003).

  The lack of full participation in these programs raises important policy questions. Why might individuals who are otherwise eligible to receive program benefits not seek them? And what causes some people to effectively overcome these barriers and ultimately obtain program benefits?

  Some answers to this latter question may arise from analyses aimed at understanding the effects of these programs. Much of the existing research has focused on the SNAP program, which is the largest domestic program aimed at alleviating food insecurity (United States Department of Agriculture, 2016). The example of SNAP will illustrate the questions regarding SSI explored here.

  Multiple studies have tried to examine the extent to which SNAP participation reduces food insecurity. Paradoxically, most early studies found that receiving SNAP benefits was actually associated with higher rates of food insecurity, even when samples were limited to people who were income-eligible for the program (e.g., Alaimo, Briefel, Frongillo, & Olson, 1998; Cohen, Ohls, Andrews, Ponza, Moreno, Zambrowski, & Cohen, 1999; Jensen, 2002; Ribar & Hamrick, 2003; Wilde & Nord, 2005). Though lack of awareness of the program surely exists, these findings appeared to rule out an information gap as the primary difference between participants and non-participants. Otherwise, among people who were eligible for the program, beneficiaries would tend to have less food insecurity, even in simple cross-sectional analyses.

  The hypothesized explanation for the actual results was twofold: perhaps SNAP beneficiaries somehow have heightened vulnerability that precipitates their entry into the program, and perhaps SNAP partially but incompletely alleviates this vulnerability (Ratcliffe, McKernan, & Zhang, 2011). Using more advanced methods, including the use of panel data (Mabli & Ohls, 2015; Nord & Golla, 2009) and instrumental variables approaches (Ratcliff et al., 2011; Shaefer & Gutierrez, 2013), more recent research has supported both hypotheses. For example, in one study food insecurity increased during the six months before eventual SNAP participants received benefits (Nord & Golla, 2009), and in another study SNAP receipt lowered the chance of being food insecure by 30% after controlling for the bias caused by the self-selection of highly food insecure families into the program (Ratcliff et al., 2011).

  Together, these studies offer initial insights into why some individuals enter the SNAP program while others who are also eligible do not. Namely, within the context of low-income individuals and families, additional factors beyond traditional socioeconomic measures may increase food insecurity among some households and in turn catalyze them to seek SNAP. Cross-sectional models adjusted for socioeconomic factors, and so something else had to be causing the increase food insecurity prior to SNAP enrollment. This is consistent with past research

demonstrating that family, health, and socioeconomic shocks contribute significantly to variation in material hardship levels among low-income families (Heflin, 2014). Recent work has also indicated that economic and family shocks, are among the triggering factors for SNAP enrollment (Kim & Shaefer, 2015).

Sudden changes in material hardship levels could be relevant for SSI as well. However, SSI differs in important ways from SNAP. Unlike with SNAP, SSI recipients must have significant disabilities in addition to having limited income and assets. Further, SSI recipients automatically receive Medicaid in many states, raising the potential importance of health insurance coverage in decisions about seeking SSI. Despite these differences, it is likely that increased material hardship may precipitate entry into SSI, as it does with SNAP. The research regarding SSI is not as robust as it is for SNAP in this area, but a handful of studies have been done. Recent work by Rose-Jacobs and her colleagues (2016) found that, among low-income families that include children with special health care needs, those receiving SSI were more likely to report household food insecurity. This result is telling because families raising children with disabilities generally have already-high baseline rates of hardship and deprivation (Parish, Rose, Grinstein-Weiss, Richman, & Andrews, 2008). Also, there is some evidence to suggest that SSI improves health outcomes among the elderly (Herd, Schoeni, & House, 2008).

This limited existing research suggests that the questions explored for SNAP must be investigated for SSI. However, there is much work to be done to identify the predictors of SSI program participation. The present study is an initial step towards addressing this gap in the literature by using the Survey of Income and Program Participation to explore factors that precipitate entry into SSI.

## Statement of problem and research questions

Benefits from the SSI program are generally seen as "assistance of last resort" (Mashaw, Perrin, & Reno, 1996; Parish, Ghosh, & Igdalsky, 2013). This phenomenon implies that the need for SSI benefits does not arise instantaneously. Rather, functional impairments and economic hardships may increase vulnerability gradually prior to being punctuated by family and economic shocks that push families over the edge. Such a scenario indicates that early interventions and supports designed to address specific vulnerabilities at the right time may prevent certain individuals (and families in the case of children with disabilities) from needing to seek benefits in the first place.

To advance an understanding of the mechanisms precipitating participation in the SSI program, this project will address the following research questions: (1) is SSI receipt associated with health and food-related material hardships in cross-sectional analyses?; and (2) is entry into the SSI program associated with pre-entry increases in health and food related material hardships?

## Methods

### Data

I utilized publicly accessible data from the 2008 panel of the Survey of Income and Program Participation. The Survey of Income and Program Participation is a nationally representative longitudinal study of the non-institutionalized US population (US Census Bureau, n.d.). The 2008 panel was administered to approximately 42,000 households over the course of

sixteen waves, which took place every four months. A set of core questions were asked during each wave. These included questions about income, assets, employment, receipt of benefits from government programs (including SSI), and a wide range of other variables. Also, additional sets of questions referred to as topical modules were asked during twelve of the sixteen waves. In waves 6 and 9 of the 2008 Survey of Income and Program Participation, there was a topical module focused on adult well-being, which included questions about health, economic hardship, and living conditions. Wave 6 also included topical modules related to functional limitations and disabilities among adults and children. In addition to the core data from each wave, data from these topical modules were focus of this project.

*The sampling design of the Survey of Income and Program Participation*

The Survey of Income and Program Participation uses a two-stage sampling design aimed at providing a representative sample of the U.S. (United States Census Bureau, n.d.). The sampling frame is the Master Address File, which is generated by the US Postal Service and utilized by the US Census Bureau for a number of its surveys. The primary sampling units are counties (each primary sampling unit is either one county if its population is large enough or multiple geographically contiguous counties with smaller populations). Primary sampling units with large populations are guaranteed inclusion in the Survey of Income and Program Participation. Less populated primary sampling units are stratified by state, and two from each state are then chosen. The probability of selection for each of these smaller primary sampling unit is in proportion to their size. Each chosen primary sampling unit is further stratified into two groups based on income, with one strata containing a disproportionate number of low-income households. This allows for oversampling of lower-income households. This oversampling is part of a broader systematic selection strategy (US Census Bureau, n.d.).

The Survey of Income and Program Participation provides various weighting variables that take into account this complex design and the probability of someone being in the sample (SIPP User Guide, 2008). These weights allow for relatively direct estimates of the number of people and households across the United States who are represented by each surveyed person and household. Person-weights can be used to calculate descriptive statistics for individual-level variables, such as race and gender. For household-level variables, such the percentage of households with income below the federal poverty level, household-weights can be used. For variance estimations, the Survey of Income and Program Participation recommends using Fay's modified balanced repeat replication method (SIPP User Guide, 2008). To prevent respondents from small geographic areas from being identifiable, the Survey of Income and Program Participation alters its primary sample units by combining them into larger variance strata and then splitting each stratum into two variance units. Fay's method is recommended for variance estimation because it is able to account for both halves of the strata that are generated. Resulting variance estimates are nominally conservative (SIPP User Guide, 2008).

**Analytic samples**

The core and topical module data for each wave of the Survey of Income and Program Participation is provided in separate data files. These files must be merged in order to conduct analyses involving multiple waves or involving both core and topical module data. To form my working data set, I first merged the core datasets from waves 6 through 12 and the topical module datasets from waves 4, 6, 7, and 9. Each core data set contains four time points of data,

one for each of the four months between the current and previous wave's questioning. The fourth month of data is generally considered to contain the most accurate data, as it is the most recent; this issue is referred to as "seam bias" (Moore, 2007). For this reason, I only utilized the month 4 data from each wave's core data files. Topical module data only contain information from the time of the survey, and so this problem does not arise for those files. In all, the resulting fully merged data file included seven continuous time points (one for each of waves 6-12) collected over the course of over two years from May-August 2010 to May-August 2012, in addition topical data from wave 4 (collected in September-December 2009).

From this starting place, I identified samples for two sets of analyses, one for research question (1) and one for research question (2). The first set comprised cross-sectional analyses comparing the material hardship levels of SSI recipients and eligible non-recipients. The second set of analyses compared changes in material hardships among eventual SSI recipients and eligible non-recipients in the time just before eventual recipients entered the SSI program ("pre-entry analyses"). The data I utilized from each wave of the Survey of Income and Program Participation for each of these sets of analyses are summarized in **Table 1**.

These specific data were chosen because they offer information on individuals during wave 6, during the one year after wave 9, and during the year in between these two waves. Waves 6 and 9 were particularly important because they were the only waves that provide detailed information on material hardships. Also, wave 6 provided highly detailed information on disability status. Using a year's worth of data on either side of these waves further allowed a balancing of two factors: (i) incorporating enough time to capture entry into SSI and its aftereffects in the context of lengthy application and approval processes, and (ii) limiting losses of sample size due to attrition.

**Criteria for inclusion in the analytic samples.** I used related but separate criteria for including individuals in the analytic samples for the cross-sectional and pre-entry analyses. I identified two comparison groups in each set of analyses: SSI recipients (or eventual SSI recipients), and eligible non-recipients.

For the cross-sectional analyses, an individual was identified as an SSI recipient if she or he was the head of household and reported receiving SSI benefits in the interview month for wave 6. The head-of-household restriction was used because the Survey of Income and Program Participation only records material hardships at the household level, and it assesses household level material hardships through interviews with the head of household.

Eligible non-recipients had to meet several criteria. These individuals had to be heads of households and not receive SSI in wave 6. In addition, they had to either report having a disability (as defined below) or be 65 years or older in wave 6 (this is referred to as "categorical eligibility"). As in previous work attempting to identify categorically eligible non-participants in survey data (Ben-Shalom & Stapleton, 2014a; Gettens, Lei, & Henry, 2016), any reported disability was accepted. The potential limitations of this approach are discussed below, given the high level of disability severity required for actual acceptance into the SSI program. Finally, these individuals also had to meet the strict income eligibility criteria for SSI based on their incomes in wave 6, and they had to meet the strict asset eligibility criteria for SSI based on their assets in wave 4 (income and asset eligibility are together referred to as "financial eligibility"). The complex income and asset calculations for SSI financial eligibility were assessed using the methods described by Davies and colleagues (2001) for using variables in the Survey of Income and Program Participation for this purpose.

**Table 1.** Data utilized from the Survey of Income and Program Participation

| Wave | Cross-sectional analyses | Pre-entry analyses |
|---|---|---|
| 4 | • Assets information | • No data used |
| 6 | • SSI status<br>• Disability status<br>• Income information<br>• Head-of-household status<br>• Material hardships<br>• Health status | • SSI status<br>• Disability status<br>• Income information<br>• Head-of-household status<br>• Material hardships<br>• Health status |
| 7 | • No data used | • SSI status<br>• Assets information<br>• Head-of-household status |
| 8 | • No data used | • SSI status |
| 9 | • No data used | • SSI status<br>• Head-of-household status<br>• Material hardships |
| 10 | • No data used | • SSI status |
| 11 | • No data used | • SSI status |
| 12 | • No data used | • SSI status |

For the pre-entry analyses, the criteria for identifying eventual SSI recipients were designed to allow for measurement of material hardship levels at two time points. The two time points were designed to be one year apart, with the second time point occurring just before SSI receipt. Achieving a one year gap between the time points was straightforward: the Survey of Income and Program Participation only measured material hardship levels during waves 6 and wave 9. Because each wave is 4 months apart, this meant that waves 6 and 9 were 1 year apart.

Ensuring that the second time point occurred just before SSI receipt was more complex. Ideally, I would have only included people who first reported SSI receipt in wave 10. Doing so would have yielded wave 9 material hardships data that were reported only 4 months before initial SSI receipt. In turn, the wave 6 material hardships data would have been reported 16 months before initial SSI receipt (i.e. one year prior to wave 9).

However, utilizing only these individuals would have led to an extremely limited sample size. In order to increase the sample size, I also included individuals who first reported receiving SSI in waves 11 or 12. For people first reporting SSI receipt in wave 11, the wave 9 data on material hardships was reported 8 months before initial SSI receipt, meaning that the wave 6 data were reported 20 months before receipt. Similarly, for people first reporting SSI receipt in wave 12, the wave 9 data on material hardships was reported 12 months before initial SSI receipt, and the wave 6 data was reported 24 months before receipt.

In sum, for the people I identified as eventual SSI recipients, I had two time points of material hardship data. The first time point (from the wave 6 data) was between 16 and 24 months prior to initial SSI receipt, and the second time point (from the wave 9 data) was between 4 and 12 months prior to initial SSI receipt. To identify these individuals, I used the following criteria: the individuals were present in the survey continuously from waves 6 through 12, they were heads of households in both waves 6 and 9, they did not receive SSI in any of waves 6 through 9, and they reported receiving SSI in at least one of waves 10, 11, or 12.

**Material hardship**

  I used the health and food-related material hardships utilized by Heflin, Sandberg, and Rafail (2009). The Survey of Income and Program Participation provides data on numerous individual material hardships. Heflin and colleagues (2009) developed latent constructs from these data, and I utilize the three individual health-related and three individual food-related measures from their final model. The three health-related hardships asked about household insurance status, any unmet need to see a doctor or visit the hospital, and any unmet need to see a dentist. The three food-related hardships asked about an inability to afford balanced meals, whether food lasted in the household, and whether household members had enough to eat.

**Other measures**

  Disability status was identified using the methodology delineated by the US Census Bureau for identifying individuals with disabilities in the Survey of Income and Program Participation (Brault, 2012). This method uses approximately 60 variables and allows for the differentiation of disabilities by severity and by the domain of impaired activities (Brault, 2012). In addition to the material hardship variables, I examined demographic variables (e.g., gender, marital status, race/ethnicity, education), employment status, and self-reported health status (dichotomized to "fair or poor" versus "excellent, very good, or good"). The grouping independent variable for the cross-sectional and pre-entry analyses were dichotomized variables that distinguished between the SSI recipients (or eventual SSI recipients) and the eligible non-recipients relevant for each respective analysis. Finally, for the pre-entry analyses, I developed a "Post" variable to indicate whether data for an individual was coming from wave 6 or wave 9. In order to create this variable, I had to restructure the data from wide format to long format.

**Statistical approach**

  I used Stata (version 14.0) for all analyses. For the cross-sectional analyses, I conducted weighted bivariate analyses. I compared SSI recipients and eligible non-recipients on each of the 6 individual material hardship variables (three each for health and food), on each demographic variable, and on health status. Next, I ran logistic regressions on the 6 individual hardships (as well as one logistic regression for health status), adjusting for demographic factors.

  For the pre-entry analyses, I again started with bivariate comparisons and continued to models of each individual hardship. I used hierarchical generalized linear models to examine the 6 individual hardships in the pre-entry analyses. The conceptual frame for these models was difference-in-differences. For the pre-entry analyses, I investigated whether the group ultimately receiving SSI benefits had a change in outcome levels between waves 6 and 9 that differed from the change in outcome levels for the group that never received SSI benefits during this time. Multi-level modeling was used in order to account for the fact that I had repeated (and therefore dependent) measures on the same individuals. This frame also allowed initial material hardship levels to vary randomly between individuals. I used the following general set of multi-level equations:

<u>Level 1 (time)</u>:

$Y_{tj} = \pi_{0j} + \pi_{1j}*Post_{tj} + r_{tj}$

Level 2 (individual):

$$\pi_{0j} = \beta_{00} + \beta_{01\text{-}05}*(\text{Demographics}_{1\text{-}5})_j + \beta_{06}*(\text{SSI\_receipt})_j + u_{0j}$$
$$\pi_{1j} = \beta_{10} + \beta_{11}*(\text{SSI\_receipt})_j$$

Combined:

$$Y_{tj} = \beta_{00} + \beta_{01\text{-}05}*(\text{Demographics}_{1\text{-}5})_j + \beta_{06}*(\text{SSI\_receipt})_j + \beta_{10}*\text{Post}_{tj}$$
$$+ \beta_{11}*(\text{SSI\_receipt})_j*\text{Post}_{tj} + u_{0j} + r_{tj}$$

$Y_{tj}$ is the outcome at time t (i.e. either wave 6 or 9) for person j. Demographics$_{1\text{-}5}$ are the five demographic variables (as measured at wave 6) that I included as covariates (age, race/ethnicity, marital status, education status, and employment status). Adjusted for demographics, $\beta_{00}$ represents the average outcome level at wave 6 for people never receiving SSI during the study period, the quantity $(\beta_{00} + \beta_{0(n+1)})$ represents the average outcome level at wave 6 for people receiving SSI during the study period, the quantity $(\beta_{00} + \beta_{10})$ represents the average outcome level at wave 9 for people never receiving SSI during the study period, and the quantity $(\beta_{00} + \beta_{0(n+1)} + \beta_{10} + \beta_{11})$ represents the average outcome level at wave 9 for people receiving SSI during the study period. $\beta_{11}$ was the estimate of interest, as it represents the difference-in-differences (i.e. the average difference in the change of outcome levels from waves 6 to 9 between the people receiving and not receiving SSI). Weighted analyses were not used, as Stata does not provide goodness-of-fit statistics for multilevel models calculated using weights; however, weighted and unweighted estimates were only nominally different.

## Results

**Cross-sectional analyses**

The final sample for the full cross-sectional analyses included 1,312 SSI recipients and 4,756 eligible non-recipients. In bivariate comparisons, SSI recipients differed from eligible non-recipients on a host of demographic factors and material hardship outcomes. Demographically, SSI recipients were, on average, younger (56 years versus 66 years, $p < 0.001$), more likely to be women (67% versus 63%, $p = 0.04$), less likely to be married and living with their spouse (17% versus 29%, $p < 0.001$), less likely to be non-Hispanic white (48% versus 69%, $p < 0.001$), and less likely to have a high school diploma or general education diploma (62% versus 76%, $p < 0.001$) (**Table R1**). SSI recipients were less likely to report having very good (11% versus 16%, $p < 0.001$) or good (25% versus 34%, $p < 0.001$) health, and they were more likely to report having fair (38% versus 31%, $p < 0.001$) or poor (23% versus 16%, $p < 0.001$) health (**Table R1**).

For health-related material hardships, SSI recipients were less likely to live in a household where someone lacked health insurance (18% versus 22%, $p = 0.006$), but they were as likely as eligible non-recipients to have unmet dental or medical needs (**Table R1**). Meanwhile, SSI recipients were more likely than eligible non-recipients to experience all three food-related material hardships (**Table R1**).

**Logistic regression models for individual material hardships and health status.** The results for logistic regressions comparing SSI recipients to eligible non-recipients on the six individual material hardships and health status, adjusting for covariates, are presented in **Table**

**Table R1 Comparison of SSI recipients to financially and categorically eligible non-recipients**

| Variable | Eligible non-recipients[a] (n = 4,756) | SSI recipients[b] (n = 1,312) | $F^c$ | P-value |
|---|---|---|---|---|
| Basic demographics | | | | |
| Age (mean), years (SE) | 66.3 (0.2) | 56.1 (0.5) | 336.9 | **<0.001** |
| Women, % (SE) | 63.0 (0.7) | 66.6 (1.4) | 4.5 | **0.04** |
| Married, living with spouse, % (SE) | 28.9 (0.7) | 16.9 (1.1) | 63.5 | **<0.001** |
| Employed at all, % (SE) | 13.8 (0.6) | 9.5 (1.0) | 12.4 | **<0.001** |
| Race/ethnicity, % (SE) | | | | |
| Non-Hispanic white | 69.3 (0.8) | 47.8 (1.6) | 150.2 | **<0.001** |
| Non-Hispanic black | 16.3 (0.7) | 28.2 (1.5) | 58.3 | **<0.001** |
| Non-Hispanic Asian | 1.6 (0.2) | 3.6 (0.5) | 24.3 | **<0.001** |
| Non-Hispanic, other | 2.6 (0.3) | 4.2 (0.5) | 9.6 | **0.002** |
| Hispanic | 10.2 (0.5) | 16.2 (1.2) | 30.0 | **<0.001** |
| Educational attainment | | | | |
| High school/GED or more, % (SE) | 76.2 (0.7) | 61.8 (1.3) | 108.2 | **<0.001** |
| Bachelor's degree or more, % (SE) | 10.3 (0.5) | 6.0 (0.6) | 25.4 | **<0.001** |
| Health status, % (SE) | | | | |
| Excellent | 4.2 (0.3) | 3.4 (0.5) | 1.4 | 0.24 |
| Very good | 15.7 (0.6) | 10.8 (1.0) | 15.1 | **<0.001** |
| Good | 33.5 (0.8) | 25.0 (1.4) | 29.7 | **<0.001** |
| Fair | 30.5 (0.8) | 37.5 (1.5) | 17.1 | **<0.001** |
| Poor | 16.1 (0.6) | 23.3 (1.4) | 29.6 | **<0.001** |
| Health hardships[d], % (SE) | | | | |
| Uninsured | 22.2 (0.6) | 18.4 (1.1) | 7.9 | **0.006** |
| Unmet dentist need | 14.6 (0.6) | 15.6 (1.1) | 0.9 | 0.33 |
| Unmet doctor/hospital need | 13.2 (0.6) | 11.0 (0.9) | 3.5 | 0.06 |
| Food hardships[d], % (SE) | | | | |
| Could not afford balanced meals | 19.4 (0.6) | 31.6 (1.5) | 71.7 | **<0.001** |
| Food did not last | 20.7 (0.6) | 32.0 (1.5) | 68.8 | **<0.001** |
| Not enough to eat | 5.0 (0.4) | 9.1 (0.9) | 28.5 | **<0.001** |

[a] Eligible non-recipients met SSI (Supplemental Security Income) income limits, met SSI assets limits, had a disability or were at least 65 years old, were ≥18 years old, and were heads of households; [b] SSI recipients were ≥18 year old heads of households; [c] For comparisons of weighted means (e.g., age), STATA conducts adjusted Wald tests, and for comparisons of weighted percentages (e.g., gender), STATA conducts corrected Pearson's χ2 tests. Both produce F statistics. All analyses weighted; [d] All hardships measured at household level (e.g., anyone in household uninsured?)


**R2 (a-b)**. SSI recipients were significantly less likely to report each health-related material hardship (uninsured: OR = 0.43, 95% CI: 0.35, 0.54; dental hardships: OR = 0.76, 95% CI: 0.61, 0.94; medical hardship: OR = 0.53, 95% CI: 0.42, 0.68) (**Table R2**). Regarding food-related hardships, SSI recipients were significantly more likely to not be able to afford balanced meals (OR = 1.23, 95% CI: 1.04, 1.44), but differences in experiencing the other two food hardships were not significant once adjusting for covariates (**Table R2**). Finally, SSI recipients were significantly less likely to report a positive health status (OR = 0.71, 95% CI: 0.61, 0.83) (**Table R2**).

**Table R2a Comparison of health and hardship among SSI recipients and financially/categorically eligible non-recipients, adjusting for covariates[a]**

| | Excellent, very good, or good health | Uninsured | Unmet Dentist Need | Unmet doctor/hospital need |
|---|---|---|---|---|
| SSI recipient[b] | 0.71*** (0.61, 0.83) | 0.43*** (0.35, 0.54) | 0.76* (0.61, 0.94) | 0.53*** (0.42, 0.68) |
| Age (years) | 1.02*** (1.01, 1.02) | 0.95*** (0.94, 0.95) | 0.96*** (0.96, 0.97) | 0.96*** (0.95, 0.96) |
| Non-Hispanic white | 0.95 (0.83, 1.10) | 0.66*** (0.58, 0.77) | 1.00 (0.83, 1.20) | 1.10 (0.91, 1.33) |
| Married, living with spouse | 1.03 (0.91, 1.16) | 1.71*** (1.46, 2.02) | 1.06 (0.90, 1.25) | 0.94 (0.78, 1.13) |
| High school/GED or more | 1.61*** (1.44, 1.80) | 0.73** (0.60, 0.87) | 0.97 (0.81, 1.17) | 0.83 (0.68, 1.03) |
| Employed at all | 2.41*** (1.97, 2.94) | 1.49*** (1.22, 1.81) | 1.32* (1.07, 1.64) | 1.41** (1.14, 1.75) |

[a] Weighted logistic regressions were used; odds ratios (95% confidence intervals) reported (constant omitted); [b] SSI (Supplemental Security Income) recipients were limited to ≥18 year old heads of households, and they were compared to eligible non-recipients (defined as people who met SSI income limits, met SSI assets limits, had a disability or were at least 65 years old, were ≥18 years old, and were heads of households; * $p<0.05$; ** $p<0.01$; ***$p<0.001$.

**Table R2b Comparison of hardship among SSI recipients and financially/categorically eligible non-recipients, adjusting for covariates[a]**

| | Could not afford balanced meals | Food did not last | Not enough to eat |
|---|---|---|---|
| SSI recipient[b] | 1.23* (1.04, 1.44) | 1.09 (0.93, 1.27) | 1.29 (0.99, 1.68) |
| Age (years) | 0.96*** (0.96, 0.97) | 0.96*** (0.95, 0.96) | 0.96*** (0.95, 0.96) |
| Non-Hispanic white | 0.82* (0.69, 0.97) | 0.71*** (0.60, 0.83) | 1.01 (0.76, 1.33) |
| Married, living with spouse | 0.78** (0.66, 0.92) | 0.75** (0.63, 0.88) | 0.98 (0.70, 1.38) |
| High school/GED or more | 0.78** (0.67, 0.91) | 0.82* (0.70, 0.96) | 0.85 (0.64, 1.13) |
| Employed at all | 0.98 (0.79, 1.21) | 1.07 (0.87, 1.32) | 1.14 (0.87, 1.50) |

[a] (see Table R2a); [b] (see Table R2a); * $p<0.05$; ** $p<0.01$; ***$p<0.001$.

**Pre-entry analyses**

Table R3 presents the pre-entry bivariate comparisons of the eventual SSI recipients (n = 148) to the eligible non-recipients (n = 3,193). Demographically, the eventual recipients were on average significantly younger (51 years versus 67 years, p < 0.001), more likely to be employed (37% versus 14%, p < 0.001), and less likely to be non-Hispanic white (55% versus 71%, p < 0.001) (Table R3).

Table R3 presents material hardship comparisons of the eventual SSI recipients and eligible non-recipients at two time points. The first time point was 16-24 months prior to SSI receipt and the second time point was 4-12 months prior to SSI receipt. SSI recipients were more likely to experience all six material hardships at both time points, and material hardship levels grew more for SSI recipients between the two time points for each of the material hardships (Table R3). The differences in each of the food-related hardships increased enough that, although none of the differences were statistically significant at the first time point, all of the differences were statistically significant at the second time point (Table R3; Figure R1). Notably and in contrast to the cross-sectional findings involving individuals *already* receiving SSI, the eventual recipients were significantly more likely at both time points to live in a household where at least one person lacked health insurance.

**Hierarchical difference-in-differences models for individual material hardships.** Difference-in-differences models for the individual hardships are presented in Table R4 (a-b). The variable of interest in all models was the interaction term, which is labeled "SSI_recipient x Time_1" in the tables. Due to the complications associated with interpreting odds ratios for interaction terms, coefficients are presented in log odds.

For the eventual SSI recipients in these pre-entry models, the chance of experiencing uninsurance (p = 0.09) and an inability to afford balanced meals (p = 0.03) increased more between the two time points than they did for the eligible non-recipients, with at least marginal statistical significance after adjusting for covariates (Table R4).

<div align="center">

**Limitations**

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The SIPP relies on self-reported data. Both disability status and receipt of public benefits like SSI carry stigma, and individuals in the survey would need to overcome these stigmas in order to be included in my analytic sample. The potential inaccuracies associated with self-reported data and the differing definitions of disability used by the Social Security Administration and the SIPP likely contributed to the fact that some individuals who identified themselves as SSI recipients also reported data suggesting a lack of categorical and/or financial eligibility for SSI. However, limiting the sample of SSI recipients to only those reporting categorical and financial eligibility did not yield different results than using the full sample of individuals identifying as SSI recipients. This result implies that self-reported receipt of SSI was likely more accurate than self-reported disability, income, and assets. Determining SSI receipt required only one question, whereas determining disability status, for example, required 60 questions. Further, the income and asset eligibility calculations were complex. It therefore seems plausible that the SSI information was more reliable. Still, there remains a degree of uncertainty created by these differing measures.

Relatedly, relying on the SIPP definition of disability to identify categorically eligible non-recipients was a potential issue because the SSI program's specific definition of disability that requires high severity. Assigning categorical eligibility to any person reporting disability in

**Table R3 Comparison of material hardship among eventual SSI recipients to financially and categorically eligible non-recipients at 16-24 months prior and 4 to 12 months prior to entry of the eventual recipients into SSI.**

| Variable | 16 to 24 months prior to SSI receipt | | | | 4 to 12 months prior to SSI receipt | | | |
|---|---|---|---|---|---|---|---|---|
| | Eligible non-recipients[a] (n = 3,193) | Eventual Recipients[b] (n = 148) | $F^c$ | P-value | Eligible non-recipients (n = 3,193) | Eventual Recipients (n = 148) | $F^c$ | P-value |
| Basic demographics | | | | | | | | |
| Age (mean), years (SE) | 67.1 (0.3) | 51.0 (1.1) | 191.5 | **<0.001** | | | | |
| Women, % (SE) | 64.0 (0.9) | 58.0 (4.2) | 2.0 | 0.16 | | | | |
| Married/living with spouse, % (SE) | 29.5 (0.8) | 35.8 (4.0) | 2.6 | 0.11 | | | | |
| Employed at all, % (SE) | 14.3 (0.7) | 36.7 (4.4) | 43.7 | **<0.001** | | | | |
| Race/ethnicity, % (SE) | | | | | | | | |
| Non-Hispanic white | 71.2 (1.1) | 54.8 (4.1) | 19.8 | **<0.001** | | | | |
| Non-Hispanic black | 14.8 (0.7) | 27.1 (4.0) | 13.3 | **<0.001** | | | | |
| Non-Hispanic Asian | 1.3 (0.2) | 1.0 (0.7) | 0.2 | 0.68 | | | | |
| Non-Hispanic, other | 2.5 (3.2) | 3.5 (1.4) | 0.6 | 0.44 | | | | |
| Hispanic | 9.5 (0.8) | 13.6 (2.8) | 2.7 | 0.10 | | | | |
| Educational attainment | | | | | | | | |
| High school/GED or more, % (SE) | 76.5 (0.8) | 75.7 (3.6) | 0.0 | 0.83 | | | | |
| Bachelor's degree or more, % (SE) | 9.7 (0.6) | 9.8 (2.8) | 0.0 | 0.95 | | | | |
| Health status, % (SE) | | | | | | | | |
| Excellent | 5.0 (0.4) | 10.2 (3.0) | 5.5 | **0.02** | | | | |
| Very good | 17.7 (0.7) | 17.6 (3.6) | 0.0 | 0.98 | | | | |
| Good | 34.9 (0.9) | 27.5 (3.9) | 2.9 | 0.09 | | | | |
| Fair | 28.4 (1.0) | 34.3 (4.2) | 2.0 | 0.16 | | | | |
| Poor | 14.0 (0.7) | 10.4 (2.6) | 1.3 | 0.25 | | | | |
| Health hardships[d], % (SE) | | | | | | | | |
| Uninsured | 20.2 (0.8) | 37.5(4.9) | 18.6 | **<0.001** | 18.4 (0.7) | 39.1 (4.8) | 29.9 | **<0.001** |
| Unmet dentist need | 15.3 (0.7) | 15.6 (3.4) | 0.0 | 0.94 | 14.6 (0.7) | 18.0 (3.9) | 0.9 | 0.35 |
| Unmet doctor/hospital need | 12.4 (0.6) | 17.1 (3.7) | 2.0 | 0.16 | 11.7 (0.7) | 18.5 (4.3) | 3.4 | 0.07 |
| Food hardships[d], % (SE) | | | | | | | | |
| Could not afford balanced meals | 19.2 (0.7) | 25.5 (3.8) | 3.2 | 0.08 | 19.6 (0.7) | 36.3 (4.0) | 25.1 | **<0.001** |
| Food did not last | 20.2 (0.7) | 26.2 (3.7) | 2.8 | 0.10 | 20.1 (8.6) | 34.7 (4.1) | 17.2 | **<0.001** |
| Not enough to eat | 4.6 (0.4) | 7.6 (2.3) | 2.4 | 0.12 | 4.7 (0.4) | 10.9 (2.6) | 10.9 | **0.001** |

[a] Eligible non-recipients never received SSI (Supplemental Security Income) from waves 6 through 12 (data from each wave collected 4 months apart), met SSI income limits at wave 6, met SSI assets limits at wave 7, had a disability or were at least 65 years old at wave 6, and were heads of households at both waves 6 and 9; [b] Eventual SSI recipients were heads of households at both waves 6 and 9, did not receive SSI in any of waves 6 through 9, and received SSI in at least one of waves 7, 8, or 9; [c] For comparisons of weighted means (e.g., age), STATA conducts adjusted Wald tests, and for comparisons of weighted percentages (e.g., gender), STATA conducts corrected Pearson's χ2 tests. Both produce F statistics. All analyses weighted using weight at wave 6; [d] All hardships measured at household level (e.g., anyone in household uninsured?)

the SIPP thus created a potential issue of having comparison groups that differed in terms of disability severity. Gettens and colleagues (2016) analyzed the potential biases and measurement errors created by using an approach similar to this one. The authors found that these potentially negative effects were unlikely to have altered their results substantially (Gettens et al., 2016). One possible explanation for these low levels of added bias is the stigma associated with reporting disability that I noted above. It is possible that such stigma leads to people with less severe disabilities to simply not report their functional impairments. Regardless, the different disability definitions between the SIPP and the SSI program are an important limitation here.

Another limitation of was the set of restrictions for including individuals in the sample. In particular, the samples in the pre-entry analyses were restricted to individuals who were adults,
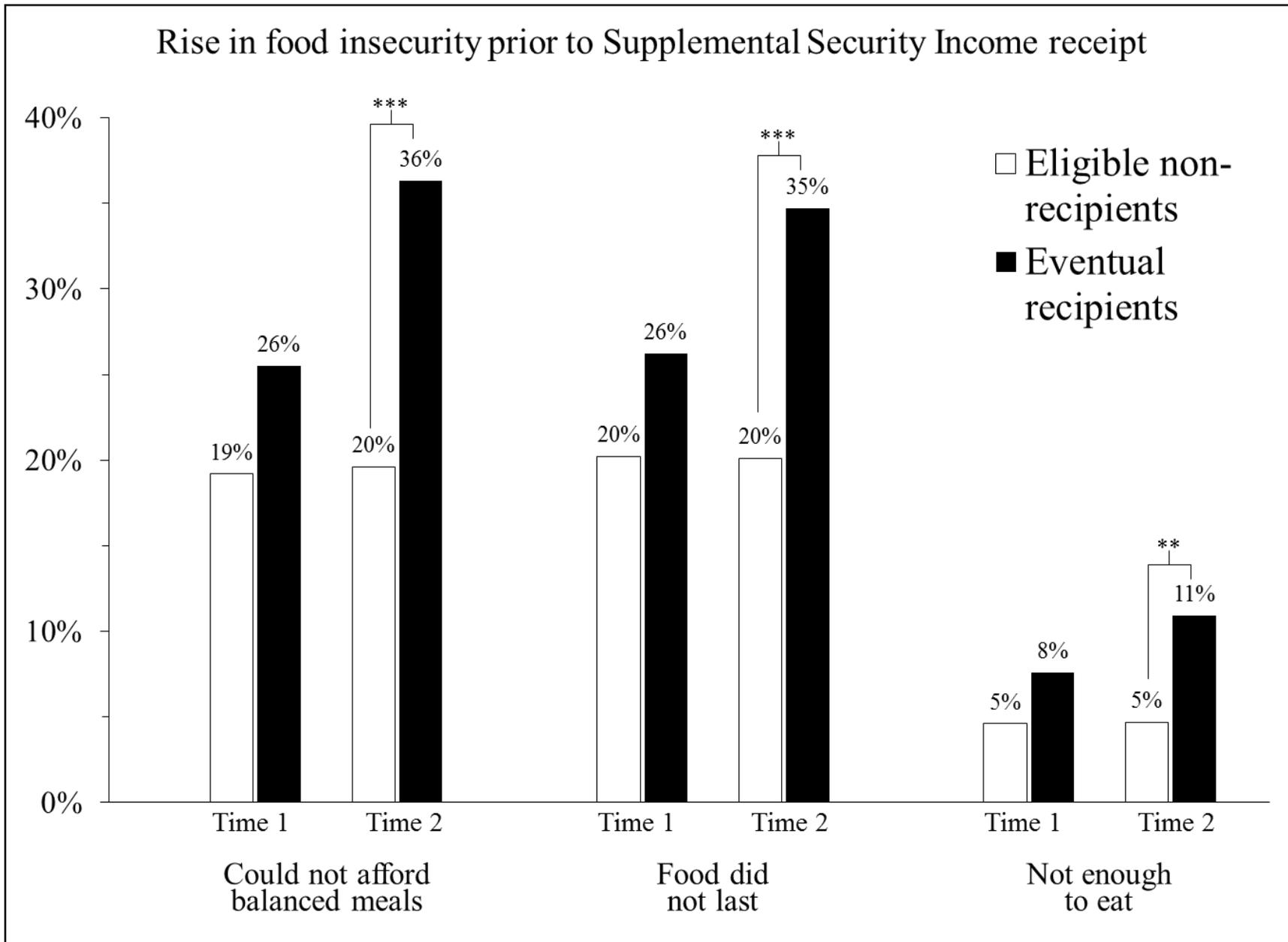
**Figure R1. Food-related hardships among eventual Supplemental Security Income (SSI) recipients and eligible non-recipients at two time points: Time 1 was 16-24 months before SSI receipt for the eventual recipients, and Time 2 was 4-12 months before SSI receipt for the eventual SSI recipients. Note: ** p<0.01; ***p<0.001.**

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**Table R4a Difference-in-difference analyses comparing hardships among eventual SSI recipients and financially/ categorically eligible non-recipients at 16-24 months prior to SSI receipt ("Time_0") and 4-12 months prior to SSI receipt ("Time_1"), adjusting for covariates[a]**

| | Uninsured | Unmet Dentist Need | Unmet doctor/hospital need |
|---|---|---|---|
| SSI_recipient[b] | -0.66 (-1.82, 0.51) | -1.08** (-1.79, -0.37) | -0.71† (-1.42, 0.00) |
| Time_1 | -0.31* (-0.55, -0.07) | -0.13 (-0.31, 0.05) | -0.16 (-0.36, 0.03) |
| SSI_recipient x Time_1 | 0.78† (-0.11, 1.67) | 0.21 (-0.57, 0.99) | 0.24 (-0.55, 1.03) |
| Age (years) | -0.21*** (-0.24, -0.18) | -0.08*** (-0.09, -0.07) | -0.08*** (-0.09, -0.07) |
| Non-Hispanic white | -1.86*** (-2.42, -1.30) | -0.17 (-0.44, 0.11) | -0.04 (-0.33, 0.25) |
| Married, living with spouse | 1.00*** (0.45, 1.54) | -0.11 (-0.38, 0.17) | -0.07 (-0.36, 0.22) |
| High school/GED or more | -1.06*** (-1.65, -0.46) | 0.09 (-0.21, 0.39) | -0.16 (-0.48, 0.15) |
| Employed at all | 0.78* (0.12, 1.44) | 0.31† (-0.02, 0.65) | 0.38* (0.03, 0.72) |

[a] Hierarchical generalized linear models were used (variance term, constant, and model fit statistics omitted); log odds (95% confidence intervals) reported; [b] Eligible non-recipients and eventual SSI (Supplemental Security Income) recipients defined as in R1.9 notes (a) and (b); † p<0.10; * p<0.05; ** p<0.01; ***p<0.001.

**Table R4b Difference-in-difference analyses comparing hardships among eventual SSI recipients and financially/ categorically eligible non-recipients at 16-24 months prior to SSI receipt ("Time_0") and 4-12 months prior to SSI receipt ("Time_1"), adjusting for covariates[a]**

| | Could not afford balanced meals | Food did not last | Not enough to eat |
|---|---|---|---|
| SSI_recipient[b] | -0.47 (-1.07, 0.13) | -0.49 (-1.08, 0.10) | -0.37 (-1.30, 0.56) |
| Time_1 | 0.00 (-0.16, 0.16) | -0.02 (-0.18, 0.14) | 0.02 (-0.26, 0.3) |
| SSI_recipient x Time_1 | 0.71* (0.06, 1.37) | 0.53 (-0.12, 1.17) | 0.59 (-0.43, 1.62) |
| Age (years) | -0.08*** (-0.08, -0.07) | -0.08*** (-0.09, -0.07) | -0.08*** (-0.09, -0.06) |
| Non-Hispanic white | -0.61*** (-0.85, -0.37) | -0.75*** (-0.98, -0.51) | -0.56** (-0.94, -0.18) |
| Married, living with spouse | -0.39** (-0.63, -0.15) | -0.32** (-0.56, -0.08) | -0.15 (-0.54, 0.25) |
| High school/GED or more | -0.36** (-0.62, -0.11) | -0.29* (-0.54, -0.04) | -0.25 (-0.67, 0.17) |
| Employed at all | -0.02 (-0.32, 0.28) | -0.05 (-0.35, 0.25) | -0.02 (-0.49, 0.44) |

[a] (see Table R4a); [b] (see Table R4a); † p<0.10; * p<0.05; ** p<0.01; ***p<0.001.

heads of households, and newly entering the SSI program. Those receiving SSI continuously from childhood into adulthood would not appear in these analyses because by definition they could not be new SSI entrants as adults. Also, people with disabilities preventing them from being a head of household would not appear in the analyses.

In the pre-entry analyses, an additional key limitation was that the relatively small samples required the use of time ranges rather than precise points in time. For example, I included in the SSI group of the pre-entry analyses anyone receiving SSI starting in waves 10, 11, or 12. Although this may have allowed for less precision than if I had limited the SSI group to only those who started receiving SSI in wave 10 (right after the second measurement point in wave 9), my approach was necessary in order to have an adequately sized analytical sample. Finally, the one year gap between waves 6 and 9 may have been too small. Especially given the length of the disability determination process, it is likely that many eventual SSI recipients in my sample would have already applied for benefits by the time of the first material hardship measurement in wave 6. The finding that there were already large disparities in material hardship prevalence between the comparison groups in wave 6 supports this idea, suggesting that there could be a rise in material hardship that starts more than 16-24 months prior to SSI receipt. If true, this would have made the results from my pre-entry difference-in-differences analyses more conservative.

**Discussion**

Using cross-sectional data, I found mixed support for the idea that receipt of Supplemental Security Income (SSI) benefits would be associated with elevated levels of health and food-related material hardships. Before adjusting for covariates, SSI recipients experienced greater food insecurity but were less likely to experience a lack of health insurance. However, these results changed somewhat after adjusting for covariates. In the logistic models, SSI recipients still experienced lower levels of all health-related hardships and greater levels of only one of the food-related hardships.

In the unadjusted pre-entry analysis, the prevalence of virtually every hardship increased for eventual SSI recipients more than they did for the eligible non-recipients. These differing patterns were particularly apparent for food-related hardships (**Figure R2**). In the adjusted models, there was still evidence that problems with health insurance and affording balanced meals rose more for the eventual SSI recipients, but results for the other hardships were no longer statistically significant.

The results regarding uninsurance were particularly interesting. In most states, SSI receipt brings guaranteed Medicaid benefits. These Medicaid benefits are likely the primary driver for the cross-sectional finding that, even when adjusting for covariates, SSI recipients are significantly less likely than eligible non-recipients to live in households facing a lack of health insurance. Combined with the finding that the prevalence of uninsurance was significantly higher among eventual SSI recipients prior to program entry and that this disparity grew in the pre-entry period (albeit with marginal statistical significance) suggests that uninsurance declines sharply after SSI receipt. Also, Medicaid coverage for SSI recipients appears to be primarily replacing a state of uninsurance rather than replacing other forms of coverage. It is therefore conceivable that individuals seek SSI at least in part because of their need for health insurance. The idea that worsening health and increasing health care needs may partially drive adults to seek Medicaid via SSI is also consistent with previous findings that children with worse health status are more likely to be enrolled in Medicaid (Lin et al., 2003).

This potential connection between SSI and health insurance status emphasizes the importance of the linkage between SSI and Medicaid. The heightened medical needs of individuals with disabilities means that the SSI program may be particularly important for their health outcomes. Another important implication is that expanding Medicaid coverage may lead to reduced SSI participation, if in fact at least some SSI beneficiaries seek SSI primarily because of a need for health insurance. Further work comparing trends in SSI participation rates between states that did and did not expand Medicaid coverage under the Affordable Care Act could yield important insights in this regard.

Proposals from the new congress and presidential administration to reverse Medicaid expansion, to reduce Medicaid funding in various ways, and to eliminate the SSI program for children could have dramatic and lasting effects on low-income people with disabilities and the US health care system (Congressional Budget Office, 2016; US House of Representatives Committee on the Budget, 2017). If health crises among people with disabilities are a key driver of their participation in SSI, then reductions in Medicaid coverage will likely heighten this need. If, in turn, SSI benefits are cut or eliminated, large numbers of people with disabilities in the midst of health crises may be left without any avenues to obtain health insurance. In addition to the potentially devastating health and financial effects that this could have on these individuals and their families, such a scenario would most likely also cause increased burdens on the health

care system. Hospitals will likely see large increases in the quantity and intensity of unreimbursed emergency care that they have to provide, straining resources. The Medicaid and SSI programs are thus not only critical to the health and well-being of individuals with disabilities. They are also critical to the stability of the current health care delivery systems in the United States.

Regarding food insecurity, the pre-entry and cross-sectional results support a conclusion that food insecurity rises just before SSI receipt and that SSI benefits do not fully address this elevated food insecurity. This result among adults is consistent with past cross-sectional results focused on child SSI recipients (Rose-Jacobs et al., 2016), and it is particularly striking given that SSI recipients are significantly more likely than non-recipients to receive Supplemental Nutrition Assistance Program (SNAP) benefits (Trenkamp & Wiseman, 2007). Food insecurity carries especially heightened health risks for vulnerable populations such as people with disabilities (Coleman-Jensen & Nord, 2013; Perez-Zepeda et al., 2016). Even combined SSI, Medicaid, and SNAP benefits do not appear to eliminate disparities in food insecurity between SSI recipients and eligible non-recipients. Deeper examinations into the interrelations between these programs are needed. Still, the present findings are strong evidence that the cash and food assistance benefits of these programs should be increased. Under current benefit levels, the health of people with disabilities receiving SSI will remain highly susceptible to the effects of food insecurity. If enacted, current congressional proposals to reduce both the SSI and SNAP programs would likely amplify this problem.

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