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## **FOOD INSECURITY AND TYPES OF DISABILITY**

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## **ABSTRACT**

One of the factors that affect food security status of the household is the presence of the disabled individual in the household. Existing studies show that types of disability of adults in the household are associated with food insecurity. Using data from 2011-2014 National Health Interview Survey (NHIS), we found that severity of vision, physical, and mental disability as well as the multiplicity of the household head's disability have a significant effect on food insecurity.

*Key words: Food insecurity, Disability, NHIS*

**JEL Classifications:** I31, I32

## **I . Introduction**

Food insecurity is defined as a household-level economic and social condition of limited or uncertain access to adequate food (USDA 2015). In 2014, about 14% of all U.S. households were food insecure, among them 5.6% of the households were very low food secure (Coleman-Jensen et al. 2015). Although food insecurity is prevalent among low-income households, the households with members with disabilities are more likely to suffer from food insecurity due to more constrained economic resources, limited working opportunities, extra demands for health services and equipment (Huang et al. 2010; Nord 2008, Mitra and Sambamoorthi 2006; Ghosh and Parish 2013). Similarly, individuals with disabilities can have substantial limitations with respect to food access, food preparation, shopping, and planning (She and Livermore 2007; Huang et al. 2012; Webber and Dollahite 2007). In addition, some types of disability can be more strongly associated with food insecurity than other types of disability. Vision, mental, and physical disabilities were associated with higher odds of food insecurity than hearing, self-care, and going-outside-home disabilities (Coleman-Jensen and Nord 2013).

However, questions whether severity and multiplicity of disability affect food insecurity have not been studied in detail. Compared to non-severe disability, severe disability can be associated with higher odds of food insecurity in that severe disability might be more detrimental to household earnings and food access. Similarly, people with multiple disabilities can be at higher risk of more severe food insecurity. Thus, in this study, using data from the National Health Interview Survey (NHIS) from 2011 through 2014, we examine the effect of severity and multiplicity of disability on adult food insecurity. We examine household heads' disability since their disability can be more closely related to household resources.

## **II. Data**

### **1. Study sample**

This study used data from the National Health Interview Survey (NHIS) from 2011 through 2014. The NHIS is an ongoing cross-sectional household interview survey that provides information on broader range of health topics with socio-demographic features of the households and targets civilian, institutionalized population in 32 states and D.C. of the United States. Since there is no overlap among households each year, observations across years in are independent.

To capture information about type, severity and multiplicity of disability of household head, data from Adult Functioning and Disability (AFD) of NHIS were used in this study. A total of 35,405 households with non-disabled and disabled household heads were used in the analysis, of which 14,928 had a household head with one or more disability.

### **2. Disability**

Centers for Disease Control and Prevention (CDC) 2015 defines disability as any condition of the body or mind (impairment) that makes it more difficult for the person with condition to do certain activities (activity limitation) and interact with the world around them (participation restrictions) and exemplify disability by vision, movement, thinking, remembering, learning, communicating, hearing, mental health, and social disability.

In the Adult Functioning and Disability (AFD) section of NHIS, respondents were asked various basic and complex activity questions regarding disability. In this study, types of disability were categorized into four subgroups; vision, hearing, physical, and mental disability. Vision and hearing disabilities are those associated with seeing and hearing as stated in the questionnaires.

Physical difficulty includes difficulties associated with walking or climbing steps. Mental disability includes difficulty in communicating using usual language and cognition problems such as remembering and concentration.

World Health Organization (WHO) Disability Assessment Schedule 2.0 provides a generic assessment instrument for health and disability to produce standardized disability levels and profiles covering 6 domains of functioning limitations which include cognition, mobility, self-care, getting along, life activities, and participation. For each domain, 36-item instrument scoring sheet categorizes severity of disability with 0=none; 1=moderate; 2=severe; and 3=extreme. A similar categorization for severity of disability is available in the ADF Section of NHIS. In the questionnaire, respondents were asked to report the degree of severity of disability as no difficulty, some difficulty, a lot of difficulty, and cannot do at all. “No difficulty” corresponds to no disability, “some” and “a lot” to non-severe disability and “cannot do at” to severe disability. Ordinal numbers one through four were assigned to the number of different disabilities the household head have in order to capture the multiplicity of disability.

### **3. Food insecurity**

USDA determines household food security levels based on responses to an 18-item questionnaire about food insecure status experienced by household members in the prior 12 months. Among 18-items, the first 10 items refer to food security status among adults and an additional 8 items refer to food secure status among children. In the “Family” section of NHIS, 10-item questionnaire was utilized to capture adults’ food insecurity in the family. Because family was a subset of the household in the NHIS data, the households with only one family were selected for the analysis based on adult food insecurity in the household. According to the guidelines of

coding responses and assessments of USDA Food Security Survey Module, adult food insecurity is classified as follows: 0 for high food security, 1-2 for marginal food secure, 3-5 for low food secure, and 6-10 for very low food secure. In our analysis, high and marginal food security levels were combined into food secure group and low and very low food security levels were combined into food insecure group.

### III. Model

We examined the relationships between food insecurity and severity and multiplicity of disability using descriptive and regression analysis. Types of disability used in the analysis were vision, hearing, physical, and mental disability of household head's. Using ANOVA, we tested the statistical significance of the association between severity of each type of disability and food insecurity using the whole sample. In addition, we looked at relationship between multiplicity of disability and food insecurity by low-income (below 199% of the federal poverty level (FPL)), and high-income (above 199% above FPL) levels.

Probit models were employed to capture the effect of types, severity, and multiplicity of disability on the food insecurity. First, we analyzed the effect of specific type of disability and its severity on food insecurity, using the whole sample (equation 1). Second, we evaluated the effect of multiplicity of disabilities of household heads' on the food insecurity, using the sample of households with disabled household head (equation 2).

$$(1) \quad FS_i^* = \beta_0 X_i + \beta_1 SV_i + \beta_2 NSV_i + \beta_3 SH_i + \beta_4 NSH_i + \beta_5 SP_i + \beta_6 NSP_i + \beta_7 SM_i \\ + \beta_8 NSM_i + \beta_9 MD_i + \varepsilon_i$$

$$(2) \quad FS_i^* = \gamma_0 X_i + \gamma_1 ND_i + \mu_i$$

where,  $FS_i = 1$  if  $FS_i^* > 0$  and  $FS_i = 0$  otherwise. In these models,  $FS_i$  is a latent variable measuring whether the adults in the household was food insecure in last 12 months which is calculated using the USDA 10-item food security survey module that was available from the “family” section NHIS yearly data sets.  $X_i$  is a vector of variables controlling for household heads’ socio-demographic characteristics such as age, gender, race, education level and characteristics of households such as federal income poverty ratio and numbers of children in the household.  $NSV_i$ ,  $SV_i$ ,  $NSH_i$ ,  $SH_i$ ,  $NSP_i$ ,  $SP_i$ ,  $NSM_i$ , and  $SM_i$  are dummy variables representing types and severity of household head’s disability.  $MD_i$  is a dummy variable and equals to one if household head had more than one disability and zero otherwise.  $ND_i$  is an ordinal number representing the total number of disability of the household head in the disabled sample that takes values between 1 to 4.

#### IV. Results

Descriptive statistics of explanatory variables used in the analysis by food security status are reported in **Table 1**. **Figure 1** presents the distribution of food insecurity status by income levels. **Table 2** shows that among households with heads with severe vision disability, percentage of food insecurity is greater than those with non-severe disability, but was not statistically significant. Among households with heads with severe hearing, physical, and mental disability, percentages of food insecurity households were higher than those with non-severe disabilities

**Table 3** indicates relationships between multiplicity of household head’s disability and food insecurity. In all three income levels, percentage of food insecure households increases as the number of household head’s disability increases. In addition, among the households with heads with same number of disability, percentage of food insecure households in low income



group was higher than those in high income group.

As shown in **Table 4**, households were more likely to be food insecure when household heads have any type of severe disability compared to non-severe disability, except for hearing disability. Adults in the households with a head with severe vision, physical, and mental disability were 6.4%, 7.4%, and 6.8% more likely to be food insecure than the adults in the households with a household head without disability, respectively. Considering the finding of Coleman-Jensen and Nord 2013 which showed mental disability leads to slightly higher likelihood in food insecurity than physical disability, our result is contrary to it. Severe and non-severe hearing disability had no significant effect on food insecurity, which is consistent with findings of Coleman-Jensen and Nord (2013) that hearing disability had no significant association with working-age adult disability. Adults in the households with a household head with non-severe physical disability were 5.4% more likely to be food insecure than the adults in the households with a household head without disability.

In the analysis we controlled for the number of different types of disability of the household head. The effect was positive but insignificant. Adults in the households with income below 199% FPL were 10.5% more likely to be food insecure than those in high-income households. Adults in the households owning a house were 4% less likely to be food insecure than the adults in the households did not own the house.

The second probit model shows that as number of household head's disability increases, the probability of being food insecure increases by 5.5%. Thus, multiple disability have a causal effect on higher likelihood of food insecurity. Among the households with a household head with disability, having income below 199% FPL leads to 14.4% more likelihood to be food insecure

and the households owning a house were 6.1% less likely to be food insecure.

## **V. Conclusion**

Our findings show that food insecurity has a causal association with specific types of disability and its severity. Household head's severe and non-severe vision, physical, and mental disabilities were associated with higher likelihood of being food insecurity. In addition, we found that accumulation of disabilities brings about higher likelihood to be food insecure among the households with a household head with disability. Individual and household-level characteristics had significant effect on household food insecurity. Our findings were consistent with the findings of the existing studies (Coleman-Jensen and Nord 2013, Huang et. al. 2010) and added to this literature by provided information on the effect of severity of types of disability and multiplicity of household head's disability on food insecurity.

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**Table 1.** Descriptive statistics of demographic characteristics of households and household Heads' by food security status<sup>1</sup>

Demographic Characteristics	High food secure (N=27,860, 78.69%)	Marginal food secure (N=2,799, 7.91%)	Low food secure (N=2,796, 7.90%)	Very low food secure (N=1,950, 5.51%)
<b>Heads' characteristics</b>				
Age	50.88 ± 0.11 <sup>2</sup>	45.30 ± 0.32	46.63 ± 0.30	46.38 ± 0.32
<b>Citizen ship</b>				
Citizen	93.21	87.82	86.70	91.33
Non-citizen	6.79	12.18	13.30	8.67
<b>Gender</b>				
Male	46.31	37.98	34.08	36.87
Female	53.69	62.02	65.92	63.13
<b>Race</b>				
White	78.46	67.56	65.88	65.79
Black	13.91	25.51	27.83	28.05
Asian	3.73	2.57	2.07	1.18
Others	3.90	4.36	4.22	4.97
<b>Education level of adults</b>				
Less than high school	11.73	23.76	28.79	26.82
High school or GED	22.67	28.72	29.54	29.38
Some college, no degree	19.32	22.26	22.07	22.00
College degree or associate degree	33.30	21.61	16.63	19.59
Higher than college	12.98	3.64	2.97	2.21
<b>Marital status</b>				
Married	38.82	28.47	25.75	17.03
Non-married	61.18	71.53	74.25	82.97
<b>Households' characteristics</b>				
<b>Household size</b>	2.05 ± 0.01	2.36 ± 0.03	2.35 ± 0.03	1.97 ± 0.03
<b>Number of kids in the household</b>	0.49 ± 0.01	0.82 ± 0.02	0.82 ± 0.02	0.59 ± 0.02
0	73.80	59.49	59.44	68.97
1	11.09	15.15	16.20	14.51
2	9.77	14.08	13.16	9.49
≥3	5.34	11.29	11.19	7.03
<b>House own status</b>				
Own	63.15	37.62	33.23	30.41
Not own	36.85	62.38	66.77	69.59
<b>Federal poverty level</b>				
0-0.99	13.64	33.90	41.81	48.26
>1.99	17.64	33.05	33.83	33.18
≥2.00 Over	68.73	33.05	24.36	18.56

<sup>1</sup>Assessed with the 10-item US Adult Food Security Module. Adults in the household were categorized as high food secure with 0 affirmative responses, marginal food secure with 1-2 affirmative responses, low food secure with 3-5 affirmative responses, and very low food secure with 6-10 affirmative responses.

<sup>2</sup>Sample mean ± SEs

**Table 2.** Results of comparative sample analysis of food insecurity by types of household head's disability and severity

		<b>Food secure n(%) (N=6,965)</b>	<b>Food insecure n(%) (N=1,168)</b>	<b>p-value</b>
<b>Vision</b>	Severe	113(83.70)	22(16.30)	0.6745
	Not Severe	1507(85.05)	265(14.95)	
<b>Hearing</b>	Severe	132(85.71)	22(14.29)	0.0025
	Not Severe	1873(92.54)	151(7.46)	
<b>Physical</b>	Severe	512(76.99)	153(23.01)	<0.0000
	Not Severe	1430(85.27)	247(14.73)	
<b>Mental</b>	Severe	95(72.52)	36(27.48)	0.0035
	Not Severe	1303(82.73)	272(17.27)	

<sup>1</sup>Test results of ANOVA. P-values correspond to F statistics to reject the null representing no severe disability association with food insecurity

**Table 3.** Results of comparative sample analysis of association between food insecurity and multiplicity of household head's disability

<b>Number of Disability</b>	<b>Low income</b>		<b>High income</b>		<b>All</b>	
	<b>Food secure n(%) (N=10,587)</b>	<b>Food insecure n(%) (N=3,703)</b>	<b>Food secure n(%) (N=20,072)</b>	<b>Food insecure n(%) (N=1,043)</b>	<b>Food secure n(%) (N=30,659)</b>	<b>Food insecure n(%) (N=4,746)</b>
<b>0</b>	5694(80.95)	1340(19.05)	12968(96.47)	475(3.53)	18662(91.14)	1815(8.86)
<b>1</b>	2549(74.16)	888(25.84)	4416(94.04)	280(5.96)	6965(85.64)	1168(14.36)
<b>2</b>	1327(65.66)	694(34.34)	1760(91.76)	158(8.24)	3087(78.37)	852(21.63)
<b>3</b>	695(58.70)	489(41.30)	689(88.45)	90(11.55)	1384(70.50)	579(29.50)
<b>4</b>	322(52.44)	292(47.56)	239(85.66)	40(14.34)	561(62.82)	332(37.18)

**Table 4.** Results of probit models for food insecurity

Demographic characteristics	Full sample (n= 35,405)		The disabled sample (n=14,928)	
	Estimated coefficients	Marginal effects	Estimated coefficients	Marginal effects
Age	-0.011***	-0.002***	-0.018***	-0.004***
Citizen Ship	-0.055*	-0.009*	-0.005	-0.001
Number of kids in the household	0.030***	0.005***	-0.031*	-0.007*
Sex	0.073***	0.012***	0.083***	0.019***
Black	0.255***	0.041***	0.286***	0.065***
Less than HS	0.539***	0.087***	0.468***	0.107***
High school or Equivalent	0.460***	0.074***	0.394***	0.090***
Some College	0.401***	0.065***	0.339***	0.077***
College or Equivalent	0.230***	0.037***	0.157**	0.036**
Marital Status	0.007***	0.001***	-0.085*	-0.020*
House own	-0.248***	-0.040***	-0.268***	-0.061***
<b>199% below FPL</b>	0.648***	0.105***	0.628***	0.144***
<b>Non-severe vision disability</b>	0.315***	0.051***		
<b>Severe vision disability</b>	0.395***	0.064***		
<b>Non-severe hearing disability</b>	0.033	0.005		
<b>Severe hearing disability</b>	0.058	0.009		
<b>Non-severe physical disability</b>	0.331***	0.054***		
<b>Severe physical disability</b>	0.457***	0.074***		
<b>Non-severe mental disability</b>	0.329***	0.053***		
<b>Severe mental disability</b>	0.420***	0.068***		
<b>More than one disability</b>	0.014	0.002		
<b>Number of disability</b>			0.239***	0.055***
<b>Number of disability ×199% below FPL</b>			0.043	0.010
Constant	-1.619***		-1.061***	

\*sig at ≤ 10%, \*\*sig at ≤ 5%, and \*\*\*sig at ≤ 1% level of significance

**Figure 1.** Distribution of food security status by income levels

