

# Impact of SNAP and WIC Program Participation on Consumption of Fruits and Vegetables

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# **Impact of SNAP and WIC Program Participation on Consumption of Fruits and Vegetables**

## **Abstract**

Using data files made available to the public by USDA's Economic Research Service, we determine factors that influence participation in SNAP and WIC programs and the impact of program participation on consumption of fruits and vegetables. Food security situation of households was determined using responses to nine survey questions on conditions and behaviors adopted by households to cope with food shortage problems at any time during the study period (last 12 months from interview date). Results from logit and Poisson regressions indicate that male-headed households are less likely to participate in SNAP than female-headed households. Both age and household size increase the probability of participating in SNAP. On the other hand, total household income decrease the likelihood of participation.

## **Introduction**

The federal food assistance program is playing a key role in supporting and advocating for increased access to food and nutritious diet by all Americans especially the eligible low-income households. About 14% of American households were food insecure all year-round in 2014 (Coleman-Jensen et al., 2014). A consistent drop in food insecurity status has been observed for most low-income Americans in the last five years. This in part is due to improvements and/or changes made to food assistance programs prior to and within this period. For instance, Coleman-Jensen et al. (2014) observed a significant drop in food insecurity status between 2011 and 2014. Little research has been undertaken to document this significant decline in food insecurity.

Dietary Guidelines for Americans (USDHHS/USDA, 2015) suggest a need for innovative designs in identifying appropriate food assistance programs that can lead to both improved

access to food and dietary choices by program participants. Increasing number of diet-related diseases is gaining more attention and is becoming a top priority issue for policy makers and the general public. Perhaps one important policy question should be whether food assistance programs can be used as a means of encouraging dietary changes. Policy adjustments to include measures aimed at increasing the consumption of fruits and vegetables (Guthrie et al. 2007). Consumption of fruits and vegetables among low-income American households is still low despite recommendations in the Dietary Guidelines for Americans. Little research has been conducted to investigate this slow consumer response to such federal guidelines. The current study estimates potential effects of SNAP and WIC program on consumption of fruits and vegetables. This study begins by first identifying factors that influence decision to participate in food assistance programs (SNAP and WIC). A number of factors determine whether or not a household is food secure. Gibson et al classified this to micro and macro-level factors/determinants. At the micro level, household factors such as earned income ethnicity, household size, age and gender determine food security status of the household (Ratcliffe et al., 2011). Regional and time variables such as state and year dummy variables constitute macro-level variables (Ratcliffe et al., 2011). Since we are using cross-sectional data our focus was majorly on household characteristics and how they affect decision to/not participate in the programs.

### **Method and Data**

Data used in this study came from the USDA's National Household Food Acquisition and Purchase Survey (FoodAPS) conducted between April 2012 and January 2013. It is a nationally representative survey of American households' food purchases and acquisitions. FoodAPS is sponsored by the USDA Economic Research Service (ERS) and Food and Nutrition Service

(FNS) to collect and publish public-use data files. It includes household as well as individual-level data of a nationally representative sample of 4,826 households. Households' characteristics that influence food purchase decisions such as household income, age, household size, race/ethnicity, and resources are included. Food security situation of households was determined using responses to 9 survey questions on conditions and behaviors adopted by households to cope with food shortage problems at any time during the study period (last 12 months from interview date). Respondents were asked questions about experiences and behaviors of household members that indicate food insecurity such as being worried whether food would run out before getting money to buy more, unable to afford balanced meals, cutting the size of meals, or being hungry because of too little money for food.

Using logit regression models, we estimated key drivers that determine participation in SNAP and WIC. Logits have been successfully used to evaluate binary outcomes. The logit model is a limited dependent variable model that is appropriate for analyzing yes or no decisions—binary outcomes such as whether individuals participated in SNAP/WIC. Using the logit model we estimate the probability of program participation given available socioeconomic characteristics. This study seeks to determine the impact that sociodemographic drivers such as household income, age, household size, ethnicity, etc. have on individuals' decision to participate in these programs.

$$Prob (SNAP = 1|x) = \frac{e^{x'\beta}}{1 + e^{x'\beta}} = \gamma(x'\beta)$$

Where parameters  $\beta$  reflect the impacts of changes in  $x$  on the probability of participating in SNAP and WIC.

## **Results and Discussion**

We identified SNAP and WIC participants for the period 2012-2013 based on the following survey question: Anyone in the household (1) receiving SNAP (snapnowhh), (2) received SNAP in last 12 months (snap12mos), (3) ever received SNAP (snapever), and/or (4) receiving WIC benefits (wichh). Responses to these questions were either yes/no with yes = 1 (participating in the program) and no = 0 (not participating in the program).

Data for 4,826 households that completed both initial and final faps interviews are reported.

Taking the primary respondent (PR) as the head of the household? The survey used the main food shopper or meal planner in the household as the primary respondent. About 74% of primary shoppers or meal planners are female, 26% are male. Based on marital status, 42% of primary respondents are married, 27, 18, 7, and 5% are never married, divorced, widowed, and separated, respectively.

Generally, the means of non-SNAP participants is significantly higher than that of SNAP participants for most vegetable categories and all fruit categories listed in Table 3 above. This suggests that participation in SNAP is not the only cause for increased consumption of fruits and vegetables by low income SNAP-eligible households. There is need, therefore, to look into other potential determinants or drivers of demand for fruits and vegetables by this group of people.

Our subsequent Poisson regression will identify these key drivers that influence individuals demand for fruits and vegetables.

## **Logit and Poisson regressions result discussion**

Male-headed households have less food insecurity situations as shown in Table 4 relative to female-headed households. Larger households (in terms of number of people in the household) are more likely to experience more food insecurity situations than smaller households. SNAP

participating households are less likely than non-participants to have many food insecurity situations as shown by negative and highly significant coefficient for *snapnowhh*. Extended lags between SNAP receipt dates tend to have significant negative effect to SNAP eligible households (Table 4).

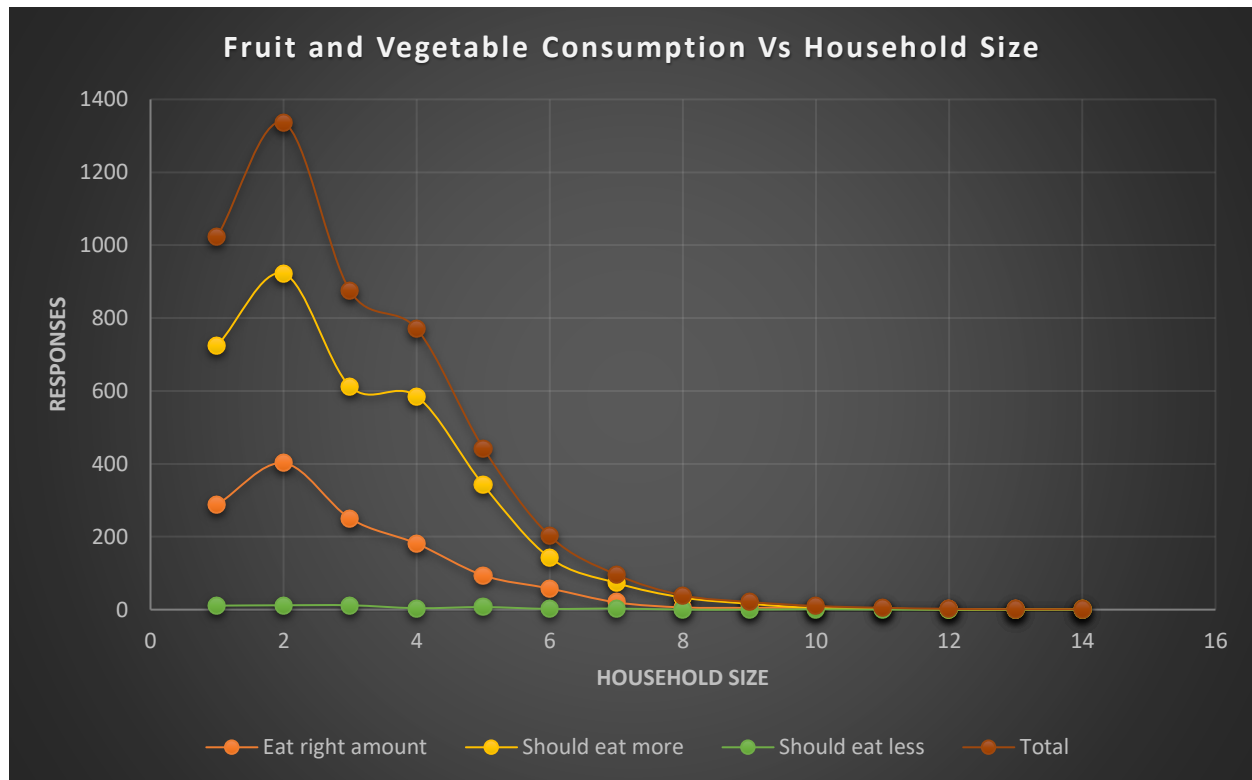
Consistency in results from both the logit and Poisson regressions models can help identify key or major determinants of SNAP participation and the number of food insecurity situations reported by households. Results from joint<sup>1</sup> analysis of determinants for participating in SNAP and WIC food programs match those from analysis of participation in only SNAP (which reveal a consistent effect of key drivers that determine participation in these programs). Male-headed households are less likely to participate in SNAP than female-headed households as shown in Table 5. Both age and household size increase the probability of participation while total household income and an older age of the household head decrease it. Consistent with Gibson-Davis and Foster (2006) and Cunyningham and Brown (2004) findings, majority of food stamp recipients are children who live in households headed by a single adult (usually female).

**A graph for responses to the question, “Do you think you eat right amount of fruits and vegetables?”**

Graph below shows the effect of household size on demand for fruits and vegetables by SNAP eligible households. This call for additional inferential statistics to flush out other potential drivers of demand for fruits and vegetables. In our study we provide an in-depth analysis of those factors that affect consumption/demand for fruits and vegetables.

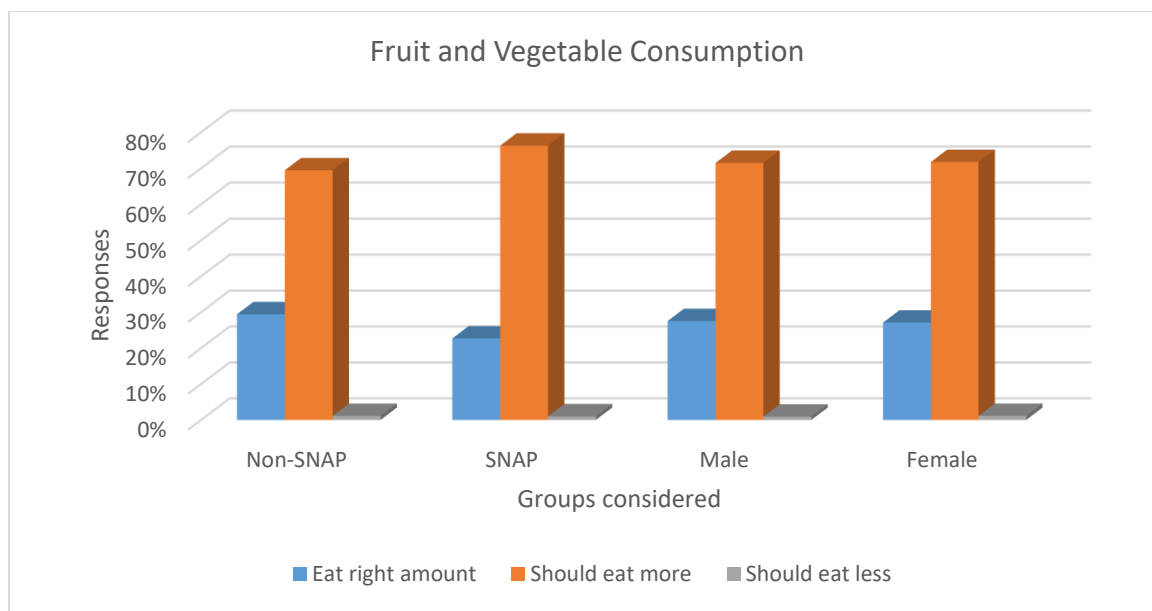
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<sup>1</sup> Considering households that received SNAP as well as WIC jointly



Similar results are obtained when respondents are grouped by SNAP participation and gender.

We can infer from this consistency (from our simple analysis) that the sampled group of consumers are in agreement that they should eat more fruits and vegetables. This study provide analysis of drivers that influence demand for fruits and vegetables. Special attention is given to the impact of SNAP participation on demand for fruits and vegetables.



### **Summary and Conclusion**

Among our sample of low-income households, 24.4% were food insecure and 10.3% were very food insecure (Table 1. Ratcliffe et al., 2011). The higher rates of food-related hardship among SNAP participants suggest that these households are needier and are more likely to self-select into SNAP (Ratcliffe et al., 2011). SNAP receipt is quite prevalent among low-income households, with roughly one-quarter (28.6%) of our sample receiving SNAP benefits. As compared with non-SNAP recipients, SNAP-recipient households tend to be younger, minority, less educated, and female headed, and to have more children. Federal food assistance programs should target such individuals. A correlation is found between program participation and low consumption of fruits and vegetables. Some policy adjustments are needed to address this problem. Probably a policy that strictly tie SNAP/WIC benefits with health-based interventions such as those that promote the consumption of fruits and vegetables.



## **Tables**

Table 1. Summary Statistics of Key variables

| <b>Variable</b>   | <b>Variable Description</b>                  | <b>Obs.</b> | <b>Mean</b> | <b>Std. Dev.</b> |
|-------------------|--|-------------|-------------|------------------|
| snapnowhh         | Receiving SNAP (yes=1, no=0)                 | 2,222       | 0.711       | 0.454            |
| wichh             | Receiving benefits from WIC? (yes=1, no=0)   | 463         | 0.585       | 0.493            |
| snapwic           | Receiving both SNAP and WIC? (yes=1, no=0)   | 2,224       | 0.823       | 0.382            |
| foodsecstatus     | Number of food insecurity conditions         | 2,224       | 2.891       | 2.727            |
| VegfoodTotal      | Total number of vegetables bought            | 2,224       | 3.795       | 4.535            |
| FreshGvegsTotal   | Number of fresh green vegetables bought      | 2,224       | 2.124       | 2.988            |
| FrozenGvegsTotal  | Number of frozen green vegetables bought     | 2,224       | 0.059       | 0.315            |
| CannedGvegsTotal  | Number of canned green vegetables bought     | 2,224       | 0.403       | 0.991            |
| freshWfruitTotal  | Total fresh whole fruits                     | 2,224       | 1.741       | 2.106            |
| FrozenWfruitTotal | Total frozen whole fruits                    | 2,224       | 0.005       | 0.082            |
| cannedWfruitTotal | Total canned whole fruits                    | 2,224       | 0.267       | 0.822            |
| gender            | Male=1, female=0                             | 2,224       | 0.340       | 0.474            |
| post4yrdeg~e      | Post-4yr college degree (yes=1, no=0)        | 2,222       | 0.130       | 0.336            |
| MwithSpouse       | Married and living with spouse (yes=1, no=0) | 2,223       | 0.204       | 0.403            |
| uscitizen         | US citizen (yes=1, no=0)                     | 382         | 0.380       | 0.486            |
| hispanic          | Hispanic (yes=1, no=0)                       | 2,222       | 0.266       | 0.442            |
| racewhite         | White (yes=1, no=0)                          | 2,222       | 0.659       | 0.474            |
| raceblack         | Black (yes=1, no=0)                          | 2,222       | 0.187       | 0.390            |
| raceasian         | Asian (yes=1, no=0)                          | 2,222       | 0.031       | 0.174            |
| age               | Age  | 2,198       | 42.433      | 13.409           |
| hhsz              | Household size                               | 2,224       | 2.602       | 1.975            |
| totfamincome      | Total household income                       | 2,224       | 857.247     | 945.755          |

Table 2. Summary Statistics of Food Security Situations

| <b>Program</b> | <b>Variable Description</b>   | <b>%</b> | <b>Mean</b> | <b>Std. Dev.</b> |
|----------------|---|----------|-------------|------------------|
| Foodsecureq1D  | In last 30 days, worried food would run out before we got money (1=True, 0=Never) | 63       | 0.630       | 0.483            |
| Foodsecureq2D  | Food ran out and had no money in last 30 days (1=True, 0=Never)                   | 51       | 0.512       | 0.500            |
| Foodsecureq3D  | Couldn't afford balanced meal in last 30 days (1=True, 0=Never)                   | 54       | 0.544       | 0.498            |
| Foodsecureq4   | Adults skipped meals b/c not enough money, in the last 30 days                    | 50       | 0.479       | 0.500            |
| Foodsecureq5   | Number of days adults skipped/cut meals b/c not enough money, in the last 30 days | -        | 7.517       | 5.245            |
| Foodsecureq6   | Eat less than felt should b/c not enough money, in the last 30 days               | 48       | 0.481       | 0.499            |
| Foodsecureq7   | Hungry but didn't eat b/c not enough money, in the last 30 days                   | 39       | 0.388       | 0.487            |
| Foodsecureq8   | Lost weight b/c not enough money, in the last 30 days                             | 25       | 0.249       | 0.433            |
| Foodsecureq9   | Skipped food the whole day b/c not enough money, in the last 30 days              | 32       | 0.321       | 0.470            |

Table 3. Mean comparisons of Fruit and vegetable consumption based on SNAP participation

|                                     | Mean comparisons  |                       |                   | p-value | T test  |
|-------------------------------------|-------------------|-----------------------|-------------------|---------|---------|
|                                     | Entire population | Non-SNAP participants | SNAP participants |         |         |
| <b>Types of vegetables consumed</b> |                   |                       |                   |         |         |
| Total number of vegetables          | 4.23              | 4.44                  | 3.91              | 0.000   | 8.1131  |
| Number of fresh green vegetables    | 2.44              | 2.68                  | 2.10              | 0.000   | 12.4231 |
| Number of frozen green vegetables   | 0.16              | 0.16                  | 0.16              | 0.8350  | 0.2083  |
| Number of canned green vegetables   | 0.42              | 0.41                  | 0.44              | 0.0206  | -2.3160 |
| <b>Fruits consumed</b>              |                   |                       |                   |         |         |
| Total fresh whole fruits            | 2.23              | 2.60                  | 1.72              | 0.000   | 19.57   |
| Total frozen whole fruits           | 0.05              | 0.06                  | 0.03              | 0.000   | 6.82    |
| Total canned whole fruits           | 0.25              | 0.03                  | 0.26              | 0.000   | 4.40    |

Table 4. Poisson Regression Results on the number of Food Insecurity Situations

| Variables   | Effect on the Number of Food Insecurity Situations |       |         |
|-------------|--|-------|---------|
|             | Coefficient  | SE    | p-value |
| snapnowhh   | -0.189   | 0.030 | 0.000   |
| gender      | -0.076   | 0.029 | 0.008   |
| educ        | -0.019   | 0.005 | 0.000   |
| age         | 0.086  | 0.006 | 0.000   |
| ageSq       | -0.001   | 0.000 | 0.000   |
| hhsiz       | -0.014   | 0.011 | 0.217   |
| TotHHincom  | -0.016   | 0.002 | 0.000   |
| hispanic    | -0.146   | 0.033 | 0.000   |
| racewhite   | -0.091   | 0.027 | 0.001   |
| MwithSpouse | 0.100  | 0.036 | 0.006   |
| _cons       | 0.179  | 0.170 | 0.292   |

Table 5. Logit Results for Determinants of participation in SNAP and WIC

|             | SNAP        |       | Joint SNAP and WIC |       |
|-------------|-------------|-------|--------------------|-------|
|             | Coefficient | SE    | Coefficient        | SE    |
| gender      | -0.449***   | 0.130 | -0.532***          | 0.133 |
| educ        | -0.016      | 0.024 | -0.001             | 0.026 |
| MwithSpouse | -0.684***   | 0.154 | -0.531**           | 0.166 |
| hispanic    | 0.021       | 0.147 | 0.158              | 0.156 |
| racewhite   | -0.739**    | 0.127 | -0.432***          | 0.132 |
| raceasian   | -0.918***   | 0.304 | -0.842**           | 0.304 |
| age         | 0.206***    | 0.024 | 0.205***           | 0.024 |
| ageSq       | -0.002***   | 0.000 | -0.002***          | 0.000 |
| hhsiz       | 0.285***    | 0.057 | 0.310***           | 0.062 |
| TotHHincom  | -0.070***   | 0.010 | -0.061***          | 0.011 |
| _cons       | -2.736***   | 0.690 | -2.462***          | 0.722 |
| N           | 2194        |       | 2194               |       |

Standard errors in parentheses; \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

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