Published in final edited form as:
Prev Med. 2013 December ; 57(6): . doi:10.1016/j.ypmed.2013.10.006.

American adults eligible for the Supplemental Nutritional Assistance Program consume more sugary beverages than ineligible adults

Sara N. Bleich, PhD[1], **Seanna Vine**[2], and **Julia A. Wolfson, MPP**[1]

[1]Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health

[2]Department of Health Policy and Management, Columbia Mailman School of Public Health

Abstract

Background—There is considerable debate about whether sugar-sweetened beverages (SSBs) should be allowable purchases with benefits from the Supplemental Nutrition Assistance Program (SNAP).

Purpose—To examine national patterns in adult consumption of SSBs by SNAP eligibility.

Methods—Cross-sectional analysis of 24-hour dietary recall data obtained from the National Health and Nutrition Examination Survey 2003–2010 (N=17,198), analyzed in 2013.

Results—In 2003–2010, 65% of adults receiving SNAP consumed SSBs, averaging 307 calories daily, and 74 grams of sugar. Compared to adults ineligible for SNAP, adults receiving SNAP consumed a higher percentage of SSBs (65% vs. 59%, $p < 0.001$), more calories from SSB per capita (210 kcal vs. 175 kcal, $p = 0.001$), and more daily calories from SSBs among drinkers (307 kcal vs. 278 kcal, $p = 0.008$). Overall, per capita consumption from SSBs was highest among adults receiving SNAP (210 kcal, 9% total daily intake), followed by adults eligible but not participating in SNAP (192 kcal, 8% total daily intake) – both of which had significantly higher SSB consumption than ineligible adults (175 kcal, 8% total daily intake) ($p < 0.05$).

Conclusion—Adults eligible for SNAP benefits consume more SSBs than ineligible adults.

Keywords

sugar-sweetened beveargе consumption; adults; SNAP

Introduction

The Supplemental Nutrition Assistance Program (SNAP), formerly the Food Stamp Program (FSP), is the largest of the fifteen federal nutrition-assistance programs and aims to provide low-income households with resources to purchase food so as to minimize the likelihood

Corresponding Author: Sara N. Bleich, Associate Professor, Department of Health Policy and Management, Bloomberg School of Public Health, Johns Hopkins University, 624 N. Broadway, Room 451, Baltimore, MD 21205, Tel: 410.502.6604; Fax: 410.614.9152, sbleich@jhsph.edu.

that they will experience food insecurity. In 2012, SNAP costs totaled $75 billion for 46.6 million individuals – roughly 1 in 7 Americans (USDA, 2013b).

SNAP places few restrictions on allowable purchases. The current law defines eligible foods as “any food or food product for home consumption except alcoholic beverages, tobacco, and hot foods or hot food products ready for immediate consumption”, which is based on the Food Stamp Act of 1964 (Public Law 88-525). The question of whether SNAP should allow beneficiaries to use their benefits to purchase SSBs is a hotly debated in political issue in the United States (Brownell and Ludwig, 2011) in large part due to the strong evidence-base linking consumption of sugar-sweetened beverages (SSBs) to the obesity epidemic (Malik et al., 2006), which currently affects one-third of U.S. adults and disproportionately impacts low income Americans (Flegal et al., 2010) along with the well documented characteristics of poorer environments which encourage unhealthy eating (e.g., high prevalence of convenience stores, targeted marketing of high calorie beverages).(An and Sturm, 2012; Grier and Kumanyika, 2008).

In the original Food Stamp Act of 1964, the House Agriculture Committee tried to prohibit soft drinks, among other items, but the Senate Agriculture Committee declined, saying that the restriction would cause “insurmountable administrative problems”. More recently, in 2011, the State of New York requested a waiver to undertake a demonstration project restricting the purchase of SSBs in New York City which was denied by the U.S. Department of Agriculture (USDA) citing concerns such as operational challenges for retailers and confusion and stigma for clients (USDA, 2011). Other states have also requested permission to restrict the purchase of SSBs using SNAP benefits (Brownell and Ludwig, 2011). To date, these requests have all been unsuccessful (Brownell and Ludwig, 2011).

While the trends and patterns of SSB consumption (Bleich et al., 2009; Nielsen and Popkin, 2004) and SNAP’s consistent success at reducing hunger and food insecurity in the U.S. (Nord M and Golla AM, 2009) have been well described in the literature, less is known about the impact of the program on diet quality – in particular, patterns of SSB consumption by SNAP eligibility. In general, the association between SNAP and diet quality is inconclusive. Some research suggests that SNAP improves diet (Berger et al., 2001; Salmon et al., 2001; Shenkin and Baum, 2001; Shenkin, 2001), other studies suggest that it does not (Manning et al., 2001; Rustom et al., 2001; Schultz et al., 2001; J. D. Shenkin et al., 2001; S. D. Shenkin et al., 2001). SSBs account for 58% of all beverage purchases made by SNAP households (Andreyeva T et al., 2012), and diet quality is generally worse among SNAP recipients as compared to SNAP eligible nonparticipants (Leung et al., 2012). However, to our knowledge, no studies to date have focused on national patterns in SSB consumption by SNAP eligibility among all adults; available evidence focuses on overall diet among low-income Americans (Leung et al., 2012). The primary purpose of this study is to describe patterns in SSB consumption (2003–2010) among U.S. adults by SNAP eligibility status.

Research Methods and Procedures

Data and Design

Data was obtained from the nationally representative continuous National Health and Nutrition Examination Survey (NHANES). The NHANES is a population-based survey designed to collect information on the health and nutrition of the U.S. population. Participants were selected based on a multi-stage, clustered, probability sampling strategy. Our analysis (conducted in 2013) combined the continuous NHANES data collection (2003–2010) to look at overall patterns during that time period. A complete description of data-

collection procedures and analytic guidelines are available elsewhere (www.cdc.gov/nchs/nhanes.htm).

Study Sample

The study sample consists of adults ages 20 and older with completed 24-hour dietary recalls. Survey respondents were excluded if they were pregnant or had diabetes at the time of data collection or if their dietary recall was incomplete or unreliable (as determined by the NHANES staff). The final analytic sample included 17,198 adults.

Measures

SNAP Status—SNAP eligibility is determined by having a household income ≤ 130% of the federal poverty level (FPL) and $2000 in countable assets (USDA, 2013a). Since the NHANES does not provide sufficient information to measure net income and assets, we focused on gross income eligibility and self-reported SNAP status.

SNAP status was defined in three ways: 1) receiving SNAP; 2) eligible but not receiving SNAP; and 3) ineligible for SNAP. Individuals were considered to be receiving SNAP if they provided an affirmative response to the question, “In the last 12 months, did (you/you or any member of your household) receive Food Stamp benefits?” and if the household income was ≤ 130 percent of the poverty level. Adults were considered income eligible non-participants in the SNAP program if they provided a negative response to the question, “In the last 12 months, did (you/you or any member of your household) receive Food Stamp benefits?” and had a household income was ≤ 130 percent of poverty. Adults were considered ineligible for the SNAP program if they lived in a household with an income > 130 percent of poverty.

Sugar-sweetened beverages—Survey respondents reported all beverages consumed in a prior 24-hour period (midnight to midnight) and reported type, quantity and time of each consumption occasion. Following the dietary interview, all reported beverage items were systemically coded using the USDA Food and Nutrient Database. Caloric content and other nutrients derived from each consumed food or beverage item were calculated based on the quantity of beverages reported and the corresponding nutrient contents by the National Center for Health Statistics (NCHS). Our definition of SSBs included the following drinks: soda, sport drinks, fruit drinks and punches (non-carbonated beverages with added sugar), low-calorie drinks, sweetened tea, and other sweetened beverages which is consistent with the definition of SSBs commonly used in the literature (Bleich et al., 2009). In order to relate our results to dietary guidelines and inform intervention strategies, we used kilocalories (1 kcal = 4.2 kJ) and fluid ounces (1 oz = 28.35 grams) as two primary measures to evaluate consumption patterns.

Body Weight Status—In the NHANES, body weight and height were measured using standard procedures in a mobile examination center. Healthy weight was defined as a body mass index (BMI) from 18.5 to 24.99 kg/m^2; overweight, BMI from 25 to 29.99 kg/m^2; and obese, BMI ≥ 30 kg/m^2.(WHO, 1988)

Other measures—Education was categorized into three mutually exclusive categories: 1) less than high school; 2) high school (or GED) and 3) more than high school. Country of birth was defined as being born in the United States versus elsewhere. Household food security was pre-defined in the NHANES data as full food security, marginal food security, and low/very low food security based on the U.S. Food Security Survey Module which consists of 18 questions (Bickel G et al., 2000). WIC status was determined by an affirmative answer to the question, “In the last 12 months, did your household receive

benefits from the WIC program, that is, the Women, Infants and Children program?" Health insurance was defined as private, public (Medicare, Medicaid/CHIP, military health, VA coverage and other government insurance) and uninsured.

Analysis

All analyses were weighted to be representative of the general population and conducted using STATA, version 12 (StataCorp, L.P., College Station, TX) to account for the complex sampling structure. Multivariate linear and logistic regressions were used to adjust for potential differences in population characteristics across the SNAP eligibility categories, including race/ethnicity (non-Hispanic white, non-Hispanic black, and Mexican-American), sex, age, marital status (married, married before, living with a partner, never married), employment status (employed, not employed), education (less than high school, high school, more than high school), health insurance (public, private, not insured), WIC status, body weight (healthy weight, overweight, obese), household food security (full, marginal, low/very low), household size (1 to 3 persons, 4 or more), and country of birth (US born, born in another country). In particular, a logistic model was used for the binary outcome (percentage of SSB drinkers) and linear models were used for the continuous outcomes (calories from SSBs, grams of sugar from SSBs, and mean ounces of SSBs). As consumption patterns may vary depending on the day of the week, we also controlled for whether or not the surveyed day was a weekday or weekend. All tables and figures report predicted means based on the adjusted models.

We additionally conducted supplementary analyses to examine differences in SSB consumption by income among adults ineligible for SNAP, time trends in SSB consumption over the study period, and SSB consumption based on the amount of the monthly SNAP benefit. To examine adjusted differences in SSB consumption by income, we divided this group into two categories – 131% to 299% FPL and ≥ 300% FPL, based on the cut points in the data. To examine time trends, we stratified the SNAP status categories by adults who responded to the survey in 2003 to 2006 and adults who responded to the survey in 2007 to 2010. To examine the association between the amount of the monthly SNAP benefit and consumption of SSBs, we used NHANES 2005–2010, which includes information on the amount of SNAP benefits received, restricted to just those adults receiving SNAP (N =1441). The maximum SNAP benefit is based on the size of the household. For example, a family of four can receive a maximum monthly benefit of $668 (Food and Nutrition Service, 2012). We divided adults receiving SNAP into two groups: < $300 monthly and ≥ $300 monthly.

For all models, statistical significance was determined at $p < 0.05$.

Results

The characteristics of the NHANES 2003–2010 sample are presented in Table 1, overall and by SNAP status This includes 1,768 adults who received SNAP, 2,886 adults who where eligible but not enrolled in the program, and 12,544 adults who were ineligible. Adults receiving SNAP, as compared to those ineligible for the program, were more likely to be women, non-Hispanic Blacks and Mexican Americans, young adults (20–44), less educated (high school education or less), never married, unemployed, living in larger households (4 or more people), low/very low food security, receiving WIC beneficiaries, uninsured, and obese ($p < 0.05$).

Overall consumption of sugar-sweetened beverages

Table 2 reports the percentage of adults consuming beverages, per capita caloric consumption, the daily caloric contribution among drinkers, and mean ounces of SSB on a typical day, overall and by SNAP status. Compared to adults who were ineligible for SNAP, adults receiving SNAP benefits consume a higher percentage of SSBs (65% vs. 59%, $p = 0.001$), more calories from SSB per capita (210 kcal vs. 175 kcal, $p = 0.001$), more daily calories from SSBs among drinkers (307 kcal vs. 278 kcal, $p = 0.008$), and more grams of sugar from SSBs (74 grams vs. 65 grams, $p = 0.002$). Adults who were eligible for SNAP but not participating in the program, compared to adults who were ineligible for SNAP, had higher per capita consumption (192 kcal vs. 175 kcal, $p = 0.042$, more daily calories from SSBs among drinkers (299 kcal vs. 278 kcal, $p = 0.053$), and more grams of sugar from SSBs (71 grams vs. 65 grams, $p = 0.038$). We observed no differences between adults receiving SNAP and income eligible adults who were not participating in the program. We also observed no differences by SNAP status in mean ounces of SSB consumed (per eating occasion or over the course of a typical day).

As shown in the supplementary tables, we also examined differences in SSB consumption by income among adults ineligible for SNAP, time trends in SSB consumption over the study period, and SSB consumption based on the amount of the monthly SNAP benefit. Adults ineligible for SNAP with relatively lower income (131% to 299% FPL), compared to those with higher income (≥ 300% FPL) had a significantly higher percentage of SSB drinkers (61% vs. 57%, $p = 0.001$) and per capita consumption from SSBs (186 kcal vs. 167 kcal, $p = 0.004$). Similar differences were found (Supplemental Table 2) when compared to the SNAP ineligible group with higher income (≥ 300% FPL). For our analysis of time trends, we observed significant declines in the per capita SSB consumption and the daily caloric contribution from SSBs among drinkers overall, among eligible adults not participating in the program, and among adults ineligible for SNAP.. For our analysis of the monthly SNAP benefit, we observed no significant differences in SSB consumption by the size of the benefit allotment.

Per capita intake of sugar-sweetened beverages

Table 3 presents per capita consumption of SSBs and its corresponding percent contribution to total daily energy intake by SNAP status. Overall, per capita consumption from SSBs was highest among adults receiving SNAP (210 kcal, 9% total daily intake), followed by eligible adults not participating in SNAP (192 kcal, 8% total daily intake) –both of which had significantly higher SSB consumption than adults ineligible for SNAP (175 kcal, 8% total daily intake) ($p < 0.05$). Among adults receiving SNAP, per capita consumption was highest among adults also receiving the WIC benefit (291 kcal, 13% total daily intake) and lowest among the elderly (82 kcal, 4% total daily intake).

Compared to adults ineligible for SNAP, adults receiving SNAP had significantly higher per capita consumption of SSB among women (173 kcal vs. 127 kcal, $p < 0.001$), non-Hispanic Whites (219 kcal vs. 173 kcal, $p = 0.005$), Mexican Americans (217 kcal vs. 182 kcal, $p = 0.047$), younger adults aged 20 to 44 (268 kcal vs. 228 kcal, $p = 0.007$), adults with less than a high school education (269 kcal vs. 222 kcal, $p = 0.006$), employed adults (206 kcal vs. 178 kcal, $p = 0.047$), adults born in the United States (214 kcal vs. 183 kcal, $p = 0.009$), households with more than four individuals (223 kcal vs. 182 kcal, $p = 0.006$), households with full food security (228 kcal vs. 169 kcal, $p < 0.001$), households receiving WIC (291 kcal vs. 226 kcal, $p = 0.019$), private insurance (254 kcal vs. 166 kcal, $p = 0.006$). Similar patterns were observed between eligible adults not participating in SNAP compared to adults ineligible for SNAP; eligible nonparticipating adults had significantly higher SSB consumption among middle age adults (age 45–64: 173 kcal vs. 145 kcal, $p = 0.02$), less

educated (less than high school: 253 kcal vs. 222 kcal, p = 0.027; high school: 254 kcal vs. 211 kcal, p = 0.011); adults born in the United States (206 kcal vs. 183 kcal, p = 0.031), adults living in households with full food security (192 kcal vs. 169 kcal, p=0.011), private insurance (198 kcal vs. 166 kcal, p = 0.041), and overweight adults (210 kcal vs. 172 kcal, p = 0.013). We observed no differences in per capita SSB consumption or the corresponding percent contribution to total energy intake between adults receiving SNAP and eligible nonparticipating adults.

Discussion

The question of whether the purchase of SSBs should be allowable with SNAP benefits is under heated debate. This study provides useful information about whether patterns of SSB consumption differ by an individuals' SNAP status. We examined three groups: adults receiving SNAP, eligible adults who were not receiving SNAP; and adults ineligible for SNAP. Our results suggest that adults eligible for SNAP benefits consume more SSBs than ineligible adults. In 2003–2010, 65% of adults receiving SNAP consumed SSBs, averaging 307 calories daily, and 74 grams of sugar. During the same time period, 61% of adults who were eligible for SNAP but not participating in the program consumed SSBs, averaging 299 calories daily and 71 grams of sugar. Among adults ineligible for SNAP, 59% consumed SSBs, averaging 278 calories daily and 65 grams of sugar. Overall, and across a range of demographic characteristics, SSB consumption was steeply and significantly lower among adults ineligible for SNAP benefits compared to those adults eligible for SNAP.

Despite research suggesting that diet quality is generally worse among SNAP recipients as compared to SNAP eligible nonparticipants (Leung et al., 2012), our results indicate that there is little or no difference in SSB consumption patterns between these two groups. This suggests that regardless of whether low-income households receive the SNAP benefit, they typically consume high levels of SSBs. Interestingly, per capita consumption of SSBs was highest among SNAP recipients also receiving the WIC benefit, perhaps due to the increase in disposable income created by the additional supplement.

There are both similarities and differences between our findings and previous research. This study is consistent with a prior study based on grocery store sales record showing high levels of SSB purchases among SNAP recipients (Andreyeva T et al., 2012). It is also consistent with earlier studies showing a positive association between SSB consumption and poverty (Bleich et al., 2009); poorer households consume more beverages with added sugar. Unlike previous research suggesting that diet quality is generally worse among SNAP recipients as compared to SNAP eligible nonparticipants (Leung et al., 2012), we observed no meaningful difference in SSB consumption among the two groups. One potential reason for this discrepancy could be differences in the definition of SNAP eligibility between the papers. Another could be the differing samples; our analysis used NHANES 2003–2010 while the Leung et al. paper used NHANES 1999–2008

Our finding that SSB consumption is comparable and high between households receiving SNAP and households eligible but not participating in the program raises the policy question of whether the purchase of SSBs should be allowable with the SNAP benefit. In other words, if restricting the purchase of SSBs is unlikely to change household purchases of SSBs, should SNAP benefits be used for the purchase of sugary beverages? The primary arguments in support of restricting the use of SNAP benefits for the purchase of SSBs include: the cost to the federal government (estimated to be $4 billion annually (Shenkin JD and Jacobson MF, 2010)) and the link to obesity and diabetes (Malik et al., 2006; Schulze et al., 2004). Opponents of restricting the use SNAP benefits to purchase SSBs change most

often point to the problems of paternalism, regressivity, stigma, and increased program complexity (Brownell and Ludwig, 2011).

The present study has several limitations. First, our reliance on single 24-hour dietary recalls may introduce inaccuracy and bias to our analyses due to: underreporting, unreliability, and conversion error. Previous research indicates that adults underreport their dietary consumption by approximately 25% (Bingham et al., 1994; Briefel et al., 1997). A single 24-hour dietary recall may not accurately represent usual dietary intake for an individual. However, it is sufficient to describe the average dietary intake of a group as the means are robust and unaffected by within-person variation.. Second, the NHANES data are cross-sectional, which only allows us to address associations rather than causality. Third, examining the association between SNAP status and SSB consumption is challenging due to self-selection bias; SNAP participants are often worse off than non-participants with respect to financial and nutritional need (Nord M and Golla AM, 2009). Because SNAP participants and non-participants may not be sufficiently comparable, it is difficult to determine whether observed differences are due to the program or unobserved differences between the groups such as a family's economic situation, nutritional need, health status, or motivation to enroll in the program. Fourth, our inclusion of low calorie beverages in the SSB category may bias our results related to energy intake towards zero. However, only a small fraction of all the beverages in the SSBs category are low calorie, so we do not expect this to significantly impact the results.

To conclude, adults eligible for SNAP benefits consume more SSBs than ineligible adults. Moreover, there is little or no difference in SSB consumption patterns between the adults receiving SNAP benefits and eligible adults not participating in the program, suggesting that low-income adults typically consume high levels of SSBs, regardless of government assistance. More research is needed to understand whether restricting the purchase of SSBs with SNAP benefits will modify consumption patterns and potentially reduce obesity risk.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

Contributors: SNB conceived the study and developed the hypotheses. JAW analyzed the data. All authors contributed to the interpretation of study findings. SNB drafted the manuscript and all authors contributed to the final draft. SNB had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Funding: This work was supported by a grant from the National Heart, Lung, and Blood Institute (1K01HL096409).

Conflicts of interest: None

Ethical standards: This research involved secondary data analysis and was determined to be exempt.

References

90 th Congress, 1st session, House Agriculture Committee Report No. 95-464, p. 321 (June 1977).

Food and Nutrition Act of 2008, Public Law. USDA, Washington DC: 1–4.

Food Stamp Act of 1964. Public Law 88–525.

An R, Sturm R. School and residential neighborhood food environment and diet among California youth. Am J Prev Med. 2012; 42:129–35. [PubMed: 22261208]

Andreyeva T, Luedicke J, Henderson KE, Tripp AS. Grocery store beverage choices by participants in federal food assistance and nutrition programs. Am J Prev Med. 2012; 43:411–8. [PubMed: 22992359]

Berger MM, Reymond MJ, Shenkin A, Rey F, Wardle C, Cayeux C, Schindler C, Chiolero RL. Influence of selenium supplements on the post-traumatic alterations of the thyroid axis: a placebo-controlled trial. Intensive care medicine. 2001; 27:91–100. [PubMed: 11280679]

Bickel, G.; Nord, M.; Price, C.; Hamilton, WJC. Service, F.a.N. Guide to Measuring Household Food Security Revised 2000. U.S. Department of Agriculture; 2000.

Bingham SA, Gill C, Welch A, Day K, Cassidy A, Khaw KT, Sneyd MJ, Key TJ, Roe L, et al. Comparison of dietary assessment methods in nutritional epidemiology: weighed records v. 24 h recalls, food-frequency questionnaires and estimated-diet records. Br J Nutr. 1994; 72:619–43. [PubMed: 7986792]

Bleich SN, Wang YC, Wang Y, Gortmaker SL. Increasing consumption of sugar-sweetened beverages among US adults: 1988–1994 to 1999–2004. Am J Clin Nutr. 2009; 89:372–81. [PubMed: 19056548]

Briefel RR, Sempos CT, McDowell MA, Chien S, Alaimo K. Dietary methods research in the third National Health and Nutrition Examination Survey: underreporting of energy intake. Am J Clin Nutr. 1997; 65:1203S–09S. [PubMed: 9094923]

Brownell KD, Ludwig DS. The Supplemental Nutrition Assistance Program, soda, and USDA policy: who benefits? JAMA. 2011; 306:1370–1. [PubMed: 21954481]

Flegal KM, Carroll MD, Ogden CL, Curtin LR. Prevalence and trends in obesity among US adults, 1999–2008. JAMA. 2010; 303:235–41. [PubMed: 20071471]

Food and Nutrition Service. Supplemental Nutrition Assistance Program: Eligibility. U.S. Department of Agriculture; 2012.

Grier SA, Kumanyika SK. The context for choice: health implications of targeted food and beverage marketing to African Americans. Am J Public Health. 2008; 98:1616–29. [PubMed: 18633097]

Leung CW, Ding EL, Catalano PJ, Villamor E, Rimm EB, Willett WC. Dietary intake and dietary quality of low-income adults in the Supplemental Nutrition Assistance Program. Am J Clin Nutr. 2012; 96:977–88. [PubMed: 23034960]

Malik VS, Schulze MB, Hu FB. Intake of sugar-sweetened beverages and weight gain: a systematic review. Am J Clin Nutr. 2006; 84:274–88. [PubMed: 16895873]

Manning EM, Worthington E, Hollingsworth J, Bailey L, Stott A, Watson O, Saltissi S, Shenkin A. Troponin T as a first-line test: the Royal Liverpool and Broadgreen University Hospital experience. Annals of clinical biochemistry. 2001; 38:280–2. [PubMed: 11392506]

Nielsen SJ, Popkin BM. Changes in beverage intake between 1977 and 2001. Am J Prev Med. 2004; 27:205–10. [PubMed: 15450632]

Nord, M.; Golla, AM. Does SNAP Decrease Food Insecurity?. In: Report, ER., editor. Untangling the Self-Selection Effect. U.S. Dept. of Agriculture; 2009.

Rustom R, Grime JS, Sells RA, Amara A, Jackson MJ, Shenkin A, Maltby P, Smith L, Hammad A, et al. Renal tubular peptide catabolism in chronic vascular rejection. Renal failure. 2001; 23:517–31. [PubMed: 11499566]

Salmon P, Hall GM, Peerbhoy D, Shenkin A, Parker C. Recovery from hip and knee arthroplasty: Patients' perspective on pain, function, quality of life, and well-being up to 6 months postoperatively. Arch Phys Med Rehabil. 2001; 82:360–6. [PubMed: 11245759]

Schultz ST, Shenkin JD, Horowitz AM. Parental perceptions of unmet dental need and cost barriers to care for developmentally disabled children. Pediatric dentistry. 2001; 23:321–5. [PubMed: 11572490]

Schulze MB, Manson JE, Ludwig DS, Colditz GA, Stampfer MJ, Willett WC, Hu FB. Sugar-Sweetened Beverages, Weight Gain, and Incidence of Type-2 Diabetes in Young and Middle-Aged Women. JAMA. 2004; 292:928, 34.

Shenkin JD, Jacobson MF. Using the Food Stamp Program and other methods to promote healthy diets for low-income consumers. American Journal of Public Health. 2010; 100:1562–4. [PubMed: 20634439]

Shenkin JD, Baum BJ. Oral health and the role of the geriatrician. J Am Geriatr Soc. 2001; 49:229–30. [PubMed: 11207880]

Shenkin JD, Davis MJ, Corbin SB. The oral health of special needs children: dentistry's challenge to provide care. ASDC journal of dentistry for children. 2001; 68:201–5. [PubMed: 11693014]

Shenkin PA. Training in metabolic medicine. Clinical medicine. 2001; 1:392. [PubMed: 11706886]

Shenkin SD, Starr JM, Pattie A, Rush MA, Whalley LJ, Deary IJ. Birth weight and cognitive function at age 11 years: the Scottish Mental Survey 1932. Arch Dis Child. 2001; 85:189–96. [PubMed: 11517097]

USDA. Letter from Jessica Shahin, Associate Administrator, Supplemental Nutrition Assistance Program USDA, to Elizabeth Berlin. Executive Deputy Commissioner, New York State Office of Temporary and Disability Assistance; 2011.

USDA. Food and Nutrition Services. Supplemental Nutrition Assistance Program. US Department of Agriculture; Washington DC: 2013a. Eligibility.

USDA. Food and Nutrition Service. Supplemental Nutrition Assistance Program participation and costs. USDA; Washington, DC: 2013b.

WHO. Obesity: Preventing and managing the global epidemic—report of a WHO consultation on obesity. WHO; Geneva: 1988.

Highlights

- There is debate about whether SSBs should be allowable purchases with SNAP benefits.
- Adults eligible for SNAP benefits consume more SSBs than ineligible adults.
- Low-income adults typically consume high levels of SSBs, regardless of SNAP status.

TABLE 1

Characteristics of US adults (aged ≥20 y) in the National Health and Nutrition Examination Survey (NHANES) 2003–2010[1]

	TOTAL	Received SNAP[4]	Eligible, but no SNAP	Ineligible for SNAP	*P* for diff
Total [*n* (%)]	17,198 (100)	1,768 (7)	2,886 (11)	12,544 (82)	
Sex [*n* (%)]					
Male	8,608 (49)	759 (41)	1,424 (47)	6,425 (50)	<0.001
Female	8,590 (51)	1,009 (59)	1,462 (53)	6,119 (50)	
Race-ethnicity [*n* (%)]					
Non-Hispanic white	8,811 (76)	688 (52)	1,204 (60)	6,919 (80)	<0.001
Non-Hispanic black	3,305 (11)	470 (24)	444 (13)	2,391 (10)	
Mexican American	4,341 (13)	542 (23)	1,087 (27)	2,712 (10)	
Age [*n* (%)]					
20–44 y	7.813 (50)	1,087 (69)	1,359 (57)	5,367 (48)	<0.001
45–64 y	5,373 (35)	457 (24)	768 (25)	4,148 (37)	
≥65 y	4,012 (15)	224 (7)	759 (18)	3,029 (15)	
Education [*n* (%)]					
Less than high school	4,681 (17)	863 (44)	1,265 (34)	2,553 (13)	<0.001
High school (or GED)	4,203 (25)	478 (29)	711 (28)	3,104 (24)	
More than high school	8,294 (57)	425 (26)	908 (38)	6,961 (63)	
Marital status [*n* (%)]					
Currently married	9,026 (57)	568 (31)	1,192 (39)	7,266 (62)	<0.001
Previously married	3,786 (18)	520 (28)	820 (25)	2,446 (16)	
Living with a partner	1,326 (8)	243 (15)	269 (11)	814 (7)	
Never married	3,052 (18)	437 (27)	604 (26)	2,011 (16)	
Employment status [*n* (%)]					
Unemployed	7,212 (33)	1,077 (58)	1,546 (48)	4,589 (29)	<0.001
Employed	9,984 (67)	691 (42)	1,340 (52)	7,953 (71)	
Country of Birth [*n* (%)]					
Born in the United States	13,174 (84)	1,336 (81)	1,816 (71)	10,022 (86)	<0.001
Born in another country	4,024 (16)	432 (19)	1,070 (29)	2,522 (14)	
Household Size [*n* (%)]					

	TOTAL	Received SNAP[4]	Eligible, but no SNAP	Ineligible for SNAP	*P* for diff
1, 2 or 3 person household	10,914 (66)	802 (45)	1,670 (59)	8,442 (68)	<0.001
4 or greater person household	6,284 (34)	966 (55)	1,216 (41)	4,102 (32)	
Household Food Security [*n* (%)]					
Full food security	12,615 (82)	649 (37)	1,604 (59)	10,362 (89)	<0.001
Marginal food security	1,585 (7)	311 (18)	431 (13)	843 (5)	
Low/very low food security	2,751 (11)	806 (45)	849 (28)	1,096 (6)	
WIC status [*n* (%)]					
Received WIC	1,590 (6)	545 (31)	408 (13)	637 (3)	<0.001
Did not receive WIC	15,582 (94)	1,222 (69)	2,476 (87)	11,884 (97)	
Health insurance status [*n* (%)]					
Private insurance	7,438 (58)	173 (11)	639 (28)	6,626 (66)	<0.001
Public insurance	4,999 (21)	795 (47)	953 (27)	3,251 (18)	
Not insured	4,163 (21)	698 (42)	1,179 (44)	2,286 (16)	
Bodyweight[2] [*n* (%)]					
Healthy	5,070 (33)	478 (29)	875 (35)	3,717 (33)	<0.001
Overweight	5,980 (35)	522 (30)	1,018 (36)	4,440 (35)	
Obese	5,660 (32)	686 (41)	886 (30)	4,088 (32)	
Poverty income ratio [*n* (%)]					
0–50% FPL	949 (4)	471 (26)	478 (19)	0	<0.001
51–100% FPL	2,139 (8)	932 (53)	1,207 (40)	0	
101–130% FPL	1,566 (6)	365 (21)	1,201 (42)	0	
131–299% FPL	5,134 (27)	0	0	5,134 (33)	
300% or greater FPL	7,410 (55)	0	0	7,410 (67)	
Day of the Week					
Weekday	10,583 (61)	1,070 (60)	1,732 (60)	4,763 (39)	0.543
Weekend	6,615 (39)	698 (40)	1,154 (40)	4,763 (39)	

Note: P-value for difference is based on chi-squared test. Column frequencies may not sum to the full sample due to missingness.

[1]Percentage of US population estimated with survey weights to adjust for unequal probability of sampling

[2]Healthy weight [BMI (kg/m^2) 18.5–24.99], Overweight (BMI 25–29.99), Obese (BMI ≥30)

TABLE 2

Percentage of U.S. adults (ages 20+) consuming SSB, per-capita kcal on the surveyed day, daily caloric contribution from SSB Among Drinkers and grams of sugar on the surveyed day, by SNAP participation status, NHANES 2003–2010[1]

	ALL	Received SNAP	Eligible, but no SNAP	Ineligible for SNAP
	Mean ± SEM	Mean ± SEM	Mean ± SEM	Mean ± SEM
Consumed SSBs on Surveyed Day (%)	59 ± 1	65 ± 2*	61 ± 1	59 ± 1
Per Capita Caloric Contribution from SSB (kcal/day)	179 ± 4	210 ± 10*	192 ± 10*	175 ± 4
Daily Caloric Contribution from SSBs among drinkers (Kcal/day)	281 ± 4	307 ± 12*	299 ± 12	278 ± 4
Daily grams of sugar from SSB among drinkers (grams/day)	66 ± 1	74 ± 3*	71 ± 3*	65 ± 1
Mean Ounces of SSB Consumed Per Eating Occasion Among Drinkers (oz/occasion)	17 ± 0	18 ± 1	18 ± 1	17 ± 0
Mean Daily Ounce of SSB Consumed among drinkers (oz/day)	30 ± 1	33 ± 1*	31 ± 1	30 ± 0

Note: Multivariate regression was used to adjust for sex, race/ethnicity, education, body-weight category, marital status, employment status, if born in the US, food security, health insurance status and whether or not the household received WIC benefits; S.E.M. = standard error of the mean.

*significantly different from those ineligible for SNAP at $p<0.05$

[1]standard errors <0.5 were rounded to 0

TABLE 3

US adult per capita consumption of sugar-sweetened beverages (SSBs) by SNAP participation status, NHANES 2003–2010.[1]

	ALL	Received SNAP	Eligible, but no SNAP	Ineligible for SNAP
	Mean ± SEM	Mean ± SEM	Mean ± SEM	Mean ± SEM
Total	179 ± 4 (8)	210 ± 10 (9)+^*	192 ± 10 (8)+*	175 ± 4 (8)
Sex				
Male	225 ± 5 (8)	244 ± 19 (9)	242 ± 14 (8)	221 ± 5 (8)
Female	132 ± 3 (7)	173 ± 12 (9)^*#	143 ± 9 (8)	127 ± 4 (7)
Race-ethnicity				
Non-Hispanic white	179 ± 6 (8)	219 ± 17 (10)^+*	193 ± 13 (8)+	173 ± 5 (7)
Non-Hispanic black	211 ± 6 (10)	215 ± 15 (9)	220 ± 19 (9)	209 ± 6 (10)
Mexican American	185 ± 7 (8)	217 ± 17 (10)^+*	192 ± 12 (8)	182 ± 7 (8)
Age				
20–44 y	234 ± 7 (10)	268 ± 15 (11)^*	253 ± 15 (10)	228 ± 7 (10)
45–64 y	150 ± 5 (7)	175 ± 14 (9)	173 ± 11 (8)*	145 ± 6 (7)
≥65 y	85 ± 8 (5)	82 ± 15 (4)	84 ± 11 (5)	86 ± 8 (5)
Education				
Less than high school	229 ± 10 (10)	269 ± 17 (11)^*	253 ± 16 (10)*	222 ± 10 (9)
High school (or GED)	219 ± 7 (9)	261 ± 23 (11)^*	254 ± 17 (10)^*	211 ± 8 (9)
More than high school	158 ± 4 (7)	176 ± 18 (9)	154 ± 13 (7)	157 ± 4 (7)
Employment status				
Employed	182 ± 4 (8)	206 ± 14 (9)^*	194 ± 14 (8)	178 ± 4 (8)
Unemployed	172 ± 6 (8)	209 ± 15 (10)^*	188 ± 11 (9)*	167 ± 6 (8)
Country of Birth				
Born in the United States	187 ± 4 (8)	214 ± 11 (9)^*	206 ± 12 (9)*	183 ± 4 (8)
Born in another country	125 ± 8 (6)	151 ± 20 (7)	124 ± 12 (6)	123 ± 8 (5)
Household Size				
1, 2 or 3 person household	180 ± 54(8)	205 ± 15 (9)^	189 ± 9 (8)	177 ± 4 (8)
4 or greater person household	187 ± 6 (8)	223 ± 14 (10)^*	207 ± 16 (8)	182 ± 6 (8)

	ALL	Received SNAP	Eligible, but no SNAP	Ineligible for SNAP
	Mean ± SEM	**Mean ± SEM**	**Mean ± SEM**	**Mean ± SEM**
Food Security				
Full food security	176 ± 4 (8)	228 ± 14 (10)^∧*+	192 ± 11 (8)^∧*#	169 ± 4 (7)
Marginal food security	207 ± 13 (9)	228 ± 21 (10)	198 ± 18 (9)	206 ± 14 (9)
Low/very low food security	237 ± 12 (10)	248 ± 18 (11)	244 ± 17 (10)	236 ± 14 (10)
WIC status				
Received WIC	235 ± 18 (11)	291 ± 30 (13)*	274 ± 27 (11)	226 ± 19 (11)
Did not receive WIC	177 ± 4 (8)	202 ± 10 (9)^∧+*	186 ± 10 (8)	174 ± 4 (7)
Health insurance status				
Private insurance	175 ± 5 (7)	254 ± 30 (10)^∧*	198 ± 16 (8)*	166 ± 4 (7)
Public insurance	188 ± 10 (9)	224 ± 15 (11)*	189 ± 12 (9)	186 ± 10 (9)
Not insured	228 ± 10 (10)	244 ± 18 (12)^∧	244 ± 16 (10)	224 ± 10 (10)
Bodyweight[2]				
Healthy	174 ± 6 (7)	191 ± 20 (9)	175 ± 14 (7)	173 ± 6 (7)
Overweight	178 ± 5 (8)	198 ± 17 (9)	210 ± 14 (9)^∧*	172 ± 5 (7)
Obese	183 ± 6 (8)	234 ± 17 (10)^∧+*	189 ± 14 (8)	178 ± 6 (8)

Note: Multivariate regression was used to adjust for sex, race/ethnicity, education, body-weight category, marital status, employment status, if born in the US, food security, health insurance status and whether or not the household received WIC benefits; S.E.M. = standard error of the mean.

[1] All values are mean per capita consumption (in kcal) from SSBs; percentage of contribution to daily energy intake in parentheses.

* significantly different from those ineligible for SNAP at p<0.05

^ significantly different from those ineligible for SNAP at p<0.05

SNAP and NOSNAP significantly different at p<0.05

+ SNAP and NOSNAP significantly different at p<0.05