Food Research and Action Center

SNAP and Public Health: The Role of the Supplemental Nutrition Assistance Program in Improving the Health and Well-Being of Americans

Introduction

The Supplemental Nutrition Assistance Program (SNAP, or "food stamps") is the largest nutrition assistance program administered by the United States Department of Agriculture (USDA) and the first line of public policy defense against hunger and undernutrition in the nation. As such, and as detailed in this brief, the program has a critical role not just in reducing hunger but in improving the health of the nation, especially among the most vulnerable Americans.

SNAP's role perhaps never has been more important than now, given the high rates of food insecurity,[1] obesity,[2,3] and diet-related chronic disease.[4,5] As James Marks, MD, MPH, Senior Vice President of the Robert Wood Johnson Foundation Health Group, recently wrote: "SNAP helps families stretch their food dollars to alleviate hunger and buy healthier foods… As we strive for a full economic recovery and a healthier nation, supporting SNAP is both the right thing to do and the smart thing to do."[6]

Overall, the brief demonstrates that poverty and food insecurity have serious consequences for health and well-being in both the short term and long term. Research shows that SNAP plays a critical role not just in alleviating poverty and food insecurity, but also in improving dietary intake and health, especially among children. For example, one of the more recent studies on this topic finds that early exposure to SNAP in childhood has favorable impacts on metabolic and economic outcomes in adulthood.[7] Increasing access to SNAP and improving SNAP benefit levels would do even more to improve the health of the nation.

This paper first will (1) provide brief background information on SNAP; (2) summarize the harmful impacts of poverty, food insecurity, and poor nutrition on health and well-being; (3) review research on SNAP's role in addressing these issues among low-income Americans; and (4) describe how this role of furthering the public's health would be enhanced if SNAP benefits were more adequate.

Background of SNAP

According to the latest figures in October 2012, 47.5 million Americans – or approximately 1 in 7 Americans – participated in SNAP.[8] This is a monthly number, and USDA estimates that 1.4 times as many people receive SNAP at some point during the year as do during an average month, suggesting that in 2012 more than 65 million Americans will have received SNAP benefits for at least one month.[9,10] (Many stays on SNAP are of short duration – half of SNAP participants entering the program are enrolled 10 months or less.[11]) Over longer periods of time, even higher proportions of Americans participate: researchers estimate that half of all American children will receive SNAP at some point during childhood,[12] and half of all adults will so at some point between the ages of 20 and 65 years.[13]

Thus, the program has a broad reach. On the other hand, at any given time approximately three in ten people eligible for SNAP do not participate in the program.[14] This problem is even more pronounced among eligible older Americans, who are far less likely to participate in the program than most other demographic groups for a variety of reasons, including barriers related to mobility, technology, and stigma, and to widespread mistaken beliefs about how the program works, who can qualify, and benefit levels.[15,16]

Among those participating in the program, most are children, elderly persons, or disabled individuals.[17] In fact, 83 percent of all SNAP benefits go to households with children, elderly persons, or nonelderly persons with disabilities.[18] Furthermore, SNAP recipients are diverse with regards to race-ethnicity, many have earned income, and the vast majority of SNAP households do not receive cash welfare benefits.[19]

The monthly benefits provided by SNAP can be used only for food, enhance the food purchasing power of eligible low-income families, and are delivered through Electronic Benefit Transfer (EBT) cards, which are used like debit cards at authorized food retailers. USDA reports that more than 90 percent of SNAP benefits are redeemed at supercenters, supermarkets, and small, medium, and large grocery stores.[20]

SNAP benefit allotments are calculated based on household income and size.[21] The maximum allotment in FY2013 is $200 a month for a single person, and $668 a month for a family of four.[22] Families with countable income from earnings, Social Security, or other sources receive less than the maximum. About 41 percent of SNAP households receive the maximum allotment.[23] The other nearly 60 percent of participating households receive less than the maximum, and are expected to spend some of their other income on food to make up the difference.[24] In FY2012, the average monthly benefit per household was $278.[25]

Poverty, Food Insecurity, and Poor Nutrition are Detrimental to Health and Well-Being

Health Consequences of Poverty

In 2011, 46.2 million Americans (15 percent of the population) lived in poverty.[26] This included 16.1 million children, or one in five children.[27] A considerable amount of research demonstrates that those living in poverty have disproportionately worse health outcomes and less access to health care than those not living in poverty.[28,29,30] To make matters worse, neighborhoods with many poor or low-income residents often have fewer resources that promote health (e.g., full-service grocery stores offering affordable foods, walking trails and parks that encourage physical activity) and more environmental threats that harm health (e.g., poor air and water quality) compared to higher income neighborhoods.[31,32,33,34,35,36]

During childhood, low-income children are more likely to experience food insecurity,[37] obesity,[38,39] tobacco exposure,[40] poor oral and dental health,[41,42] asthma,[43] poor academic outcomes,[44] and behavioral and emotional problems,[45] and to engage in health-compromising behaviors (e.g., smoking)[46] compared to their higher income peers. Childhood poverty and socioeconomic inequalities have implications in adulthood as well – adults who were poor as children are at increased risk for cardiovascular disease, diabetes, obesity, substance abuse, smoking, depression, periodontal disease, and cognitive impairments.[47,48,49] Poverty and the health consequences of poverty have serious economic consequences, especially for children, including higher health care costs, lost productivity, low earnings, and an increased risk of poverty later in life.[50,51]

Adults living in poverty are at greater risk for a host of health problems as well, such as diabetes, heart disease, obesity, depression, disability, and poor oral health.[52,53,54,55] The high levels of stress facing low-income families, including children, can contribute to or worsen existing health problems.[56,57] Furthermore, poverty reduces life expectancy and quality of life – one recent estimate finds that those living at less than 200 percent of the federal poverty line lose 8.2 years of quality-adjusted life expectancy.[58]

Health Consequences of Food Insecurity

In 2011, 33.5 million adults (14.5 percent of all adults) and 16.7 million children (22.4 percent of all children) lived in food insecure households.[59] Similar to poverty, food insecurity is associated with some of the most costly health problems in the United States, including diabetes,[60,61] heart disease,[62] depression,[63,64] obesity,[65,66] and pregnancy complications (e.g., gestational diabetes).[67] And among seniors, food insecurity has been linked with poor or fair health status, diabetes, anemia, depression, disability, limitations in daily activities, decreased quality of life, and lower intakes of calories and key nutrients.[68,69] In addition, because of limited resources, individuals in food insecure households – especially the elderly – often are forced to choose food over medication,[70,71] postpone preventive or needed medical care,[72,73] dilute or ration infant formula,[74] or forgo the foods needed for special medical diets (e.g., diabetic diets).[75] Such practices and behaviors not only exacerbate disease and compromise health, but also increase expensive physician encounters, emergency room visits, and hospitalizations.[76,77]

The consequences of food insecurity – and even marginal food security[78,79] – are especially detrimental to the health, development, and well-being of children.[80,81,82,83] Research shows a clear link between food insecurity and low birth weight,[84,85] birth defects,[86] iron deficiency anemia,[87] more frequent colds and stomachaches,[88] developmental risk,[89] mental health problems,[90,91,92] and poor educational outcomes[93,94] for children – all of which have serious health and economic consequences in both the short term and long term. (For a more thorough review of the literature on the harmful effects of childhood food insecurity, see Endnotes 79, 80, and 81.)

Health Consequences of Poor Nutrition

Americans from all income groups fall short of meeting federal dietary guidance – consuming diets too low in fruits, vegetables, whole grains, and low fat dairy, and consuming diets too high in added sugars, sodium, and solid fats.[95,96,97,98] In general, poor dietary intake (e.g., excess saturated or *trans* fat intake, a diet low in fruits and vegetables) has been linked to hypertension, cardiovascular disease, some types of cancer, diabetes, osteoporosis, and other chronic diseases and conditions.[99] In addition, inadequate dietary intake during pregnancy and early childhood – which may be a consequence of food insecurity – can increase the risk for birth defects, anemia, low birth weight, and developmental risk.[100,101,102]

Poor dietary intake also contributes to obesity, which is associated with many serious physiological, psychological, and social consequences for children and adults, including high blood pressure,[103,104] heart disease,[105] diabetes,[106,107] pregnancy-related complications,[108] decreased life expectancy,[109] asthma,[110,111] depression,[112,113] and stigmatization.[114,115]

Food insecure and low-income people are especially vulnerable to poor nutrition and obesity due to the additional risk factors associated with poverty, including limited resources, lack of access to healthy and affordable foods, fewer opportunities for physical activity, cycles of food deprivation and overeating, high levels of stress, greater exposure to marketing of obesity-promoting products, and limited access to health care.[116] In addition to these unique challenges, those who are food insecure or low-income are subject to the same influences as other Americans in trying to consume a healthful diet and maintain a healthful weight (e.g., more sedentary lifestyles, increased portion sizes).[117]

SNAP Improves the Health and Well-being of Low-Income Americans

Research shows that SNAP plays a critical role in alleviating poverty and food insecurity and in improving dietary intake, weight outcomes, and health, especially among the nation's most vulnerable children. The following selection of studies demonstrates these points.

SNAP Alleviates Poverty

- Nationally, 3.9 million people – 1.7 million children and 300,000 elderly persons – were lifted above the poverty line in 2011 under the alternative poverty computation that counts SNAP benefits as income, based on the Census Bureau's latest data on poverty and income in the United States.[118]
- In FY2011, 13 percent of participating households moved above the poverty line when SNAP benefits were included in gross income, and 15 percent of the poorest SNAP households moved out of extreme poverty.[119]
- The average annual decline in the depth and severity of child poverty when adding SNAP benefits to income was 15.5 and 21.3 percent, respectively, according to Current Population Survey data from 2000 to 2009.[120]

SNAP Reduces Food Insecurity

- The temporary increase in SNAP benefit levels from the American Recovery Reinvestment Act (ARRA) of 2009 helped reduce food insecurity by 2.2 percentage points and reduce very low food insecurity by 2.0 percentage points among low-income households between December 2008 (pre-ARRA) and December 2009 (about eight months post-ARRA).[121]
- According to one recent estimate using national data, SNAP reduces childhood food insecurity by at least 8.1 percentage points "and perhaps much more."[122]
- Among low-income households experiencing food insecurity, the odds of being food secure two years later were almost four times higher for SNAP participants compared to non-participants, according to a study that used national, longitudinal data.[123]
- Children's HealthWatch researchers found that children receiving SNAP benefits were 26 percent less likely to be food insecure when compared to income-eligible non-participants.[124]

SNAP Protects Against Obesity

- Based on a study of 772 low-income families from a national sample, food insecure girls participating in the school lunch, school breakfast, or SNAP programs (or all three programs combined) had a lower risk of overweight compared to food insecure girls from non-participating households.[125]

- In a study controlling for food security status, current adult SNAP participants in Massachusetts living in households participating in the program for at least 6 months had a lower body mass index (BMI, an indicator of excess body fat) compared to those participating less than 6 months, suggesting that long term participation is associated with lower BMI.[126]
- A study set in eight New York City area primary care practices found that food insecurity was significantly associated with increased BMI only in those women not receiving food assistance (SNAP or WIC), suggesting that food assistance program participation plays a protective role against obesity among food insecure women.[127]
- Increasing participation in the federal nutrition programs – including SNAP – was recommended in two Institute of Medicine (IOM) reports focused on child obesity prevention.[128,129]

SNAP Improves Dietary Intake

- Based on national food consumption data, each additional SNAP dollar increased a household's score for overall dietary quality (as measured by USDA's Healthy Eating Index).[130]
- Household participation in SNAP increased preschool children's intake of iron, zinc, niacin, thiamin, and vitamin A, according to a national sample of 499 children.[131]
- Young children enrolled in SNAP and WIC, either or both, had lower rates of nutritional deficiency than low-income non-participants, based on a study of more than 350,000 children in Illinois.[132]

SNAP Improves Other Health Outcomes

- Exposure to SNAP *in utero* or in early childhood reduced the incidence of metabolic syndrome (obesity, hypertension, diabetes, heart disease) in adulthood and, for women, increased economic self-sufficiency (e.g., educational attainment, earnings), based on a study published in 2012 of people who grew up in disadvantaged families and were born between 1956 and 1981.[133]
- Young, Black children from families whose SNAP benefits were reduced in the past year were 38 percent more likely to be in fair or poor health (versus in good or excellent health) compared to their counterparts that did not experience such SNAP benefit reductions, based on a study of children visiting inner-city emergency departments or clinics.[134]
- Compared to low-income non-participants, children participating in SNAP, WIC, or both programs had lower rates of failure to thrive, according to a study of more than 350,000 children in Illinois.[135]
- Young, food insecure children who participated in SNAP had fewer hospitalizations than comparable non-participants and were less likely to be in poor/fair health, based on responses from more than 17,000 caregivers in six urban centers.[136]
- SNAP-recipient children of immigrant mothers were more likely to be in good or excellent health and live in a food secure household, and their families were less likely to have to make health care trade-offs (e.g., paying for health care costs instead of paying for food or housing), when compared to income-eligible non-participants.[137]
- Food insecure seniors participating in SNAP were less likely to be depressed than non-participants, according to analyses from a large, nationally representative sample of adults over 54 years of age.[138]

SNAP Improves Health; More Adequate SNAP Benefit Levels Will Further Improve Health and Well-Being

The evidence shows that SNAP alleviates poverty, reduces food insecurity, improves dietary quality, protects against obesity, and improves health, especially among children. However, inadequate benefits – the most important weakness of SNAP – severely limit the program's ability to do more to improve the health of low-income Americans. Regular monthly benefits are just too low to stave off hunger for a full month, much less allow a family to purchase a healthful diet on a consistent basis.

The nation has just run a large experiment involving more adequate benefits, and it worked. Average benefits in FY2011 reflected a temporary boost in allotments pursuant to the American Recovery Reinvestment Act (ARRA) of 2009 – initially by 13.6 percent for those receiving the maximum allotment. This increase was in recognition of the effective and quick stimulative effect of SNAP benefits on the economy as well as the recognition that hard-hit families needed additional assistance.

Subsequent research on the ARRA boost and benefit adequacy suggest that SNAP's favorable impacts on health are even greater the higher the level of SNAP benefits, as highlighted in the following selection of studies.

More Adequate Benefits Improve Food Security and General Health

- The temporary ARRA increase in SNAP benefit levels helped reduce food insecurity, as already mentioned, and helped increase food expenditures by 5.4 percent among low-income households between December 2008 (pre-ARRA) and December 2009 (about eight months post-ARRA).[139]
- After the ARRA boost, SNAP households also exhausted benefits later in the month – they were able to save slightly more benefits for use at the end of the month.[140]
- A 2011 demonstration project providing $60 per month in EBT-delivered benefits to purchase food for low-income children in summer months (not limited to SNAP-recipient children) found a 19 percent reduction in food insecurity and 20 percent reduction in very low food security.[141]
- Two years after the temporary ARRA boost, young children in households receiving SNAP benefits were significantly more likely to be "well" than children from non-participating low-income households, according to a study of nearly 3,400 young children in emergency rooms and primary care clinics.[142] Such a difference was not observed prior to the benefit boost – that is, improved SNAP benefit levels positively impacted child health. (Children were classified as "well" if they were in good health per parent report, were developing normally, were not overweight or underweight, and had never been hospitalized.)

More Adequate Benefits Improve Dietary Quality

- As already mentioned, each additional SNAP dollar increases a household's score for overall dietary quality.[143] The higher the level of SNAP benefits, the larger the positive nutritional effect of program participation. Positive effects were most evident for the vegetable, dairy, meat, and sodium components of the USDA's Healthy Eating Index.
- In a 2010 report from USDA examining the potential impact of an increase in SNAP benefits on a number of measures of dietary quality, spending more money on food was associated with positive improvements in dietary quality, energy density, nutrient density, and fruit and vegetable consumption.[144]

More Adequate Benefits Protect Against Obesity

- A larger amount of SNAP dollars received in the previous month was associated with significantly lower BMI and waist circumference among women reporting SNAP benefit levels, according to a national study that used 2005-2006 data.[145]
- Food insecurity was significantly related to increased BMI among North Carolina women receiving less than $150 in SNAP benefits per household member, but not related among those women receiving $150 or more in benefits.[146] In addition, the mean BMI of women receiving at least $150 in benefits per household member was significantly lower than the mean BMI of women receiving less than $150 in benefits. These findings "suggest that the provision of adequate SNAP benefits per household member might partially ameliorate the negative effects of food insecurity on BMI."

Conclusion

Protecting and improving the public's health is critically important for the nation and requires a combination of individual and environmental interventions. We need less poverty, food insecurity, inadequate dietary intake, and obesity. Research shows that SNAP alleviates these problems and improves health and well-being. Increasing access to SNAP and improving SNAP benefit levels would further SNAP's role in improving the public's health.

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Endnotes

[1] Coleman-Jensen, A., Nord, M., Andrews, M., & Carlson, S. (2012). Household food security in the United States, 2011. *Economic Research Report*, 141. Washington, DC: U.S. Department of Agriculture, Economic Research Service.

[2] Flegal, K. M., Carroll, M. D., Kit, B. K., & Ogden, C. L. (2012). Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999-2010. *Journal of the American Medical Association*, 307(5), 491-497.

[3] Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2012). Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. *Journal of the American Medical Association*, 307(5), 483-490.

[4] Centers for Disease Control and Prevention. (2011). *National Diabetes Fact Sheet: National Estimates and General Information on Diabetes and Prediabetes in the United States, 2011*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

[5] Roger, V. L., Go, A. S., Lloyd-Jones, D. M., Benjamin, E. J., Berry, J. D., Borden, W. B., Bravata, D. M., Dai, S., Ford, E. S., Fox, C. S., Fullerton, H. J., Gillespie, C., Hailpern, S. M., Heit, J. A., Howard, V. J., Kissela, B. M., Kittner, S. J., Lackland, D. T., Lichtman, J. H., Lisabeth, L. D., Makuc, D. M., Marcus, G. M., Marelli, A., Matchar, D. B., Moy, C. S., Mozaffarian, D., Mussolino, M. E., Nichol, G., Paynter, N. P., Soliman, E. Z., Sorlie, P. D., Sotoodehnia, N., Turan, T. N., Virani, S. S., Wong, N. D., Woo, D., Turner, M.B.; American Heart Association Statistics Committee and Stroke Statistics Subcommittee. (2012). Heart disease and stroke statistics - 2012 update: a report from the American Heart Association. *Circulation*, 125(1), e2-e220.

[6] Marks, J. S. (2012). *Congress: Do No Harm to SNAP*. Available at: http://www.huffingtonpost.com/james-s-marks/congress-do-no-harm-to-sn_b_2270786.html. Accessed on January 7, 2013.

[7] Hoynes, H. W., Schanzenbach, D. W., & Almond, D. (2012). Long run impacts of childhood access to the safety net. *NBER Working Paper*, 18535. Cambridge, MA: National Bureau of Economic Research.

[8] U.S. Department of Agriculture, Food and Nutrition Service. (2013a). *Supplemental Nutrition Assistance Program*. Available at: http://www.fns.usda.gov/pd/34SNAPmonthly.htm. Accessed on January 7, 2013.

[9] Mabli, J., Tordella, S., Castner, L., Godfrey, T., & Foran, P. (2011). *Dynamics of Supplemental Nutrition Assistance Program Participation in the Mid-2000s*. Alexandria, VA: U.S. Department of Agriculture, Food and Nutrition Service, Family Programs Analysis Branch, Office of Research and Analysis.

[10] U.S. Department of Agriculture, Food and Nutrition Service, 2013a.

[11] Mabli et al., 2011.

[12] Rank, M. R. & Hirschl, T. A. (2009). Estimating the risk of food stamp use and impoverishment during childhood. *Archives of Pediatrics and Adolescent Medicine*, 163(11), 994-999.

[13] Rank, M. R. & Hirschl, T. A. (2005). Likelihood of using food stamps during the adulthood years. *Journal of Nutrition Education and Behavior*, 37(3), 137-146.

[14] Leftin, J., Eslami, E., & Strayer, M. (2011). *Trends in Supplemental Nutrition Assistance Program Participation Rates: Fiscal Year 2002 to Fiscal Year 2009.* Alexandria, VA: U.S. Department of Agriculture, Food and Nutrition Service, Office of Research and Analysis.

[15] Leftin et al., 2011.

[16] Maryns, N. (2008). *Access and Access Barriers to Getting Food Stamps: A Review of the Literature*. Washington, DC: Food Research and Action Center.

[17] Strayer, M., Leftin, J., & Eslami, E. (2012). *Characteristics of Supplemental Nutrition Assistance Program Households: Fiscal Year 2011*. Report No. SNAP-12-CHAR. Alexandria, VA: U.S. Department of Agriculture, Food and Nutrition Service, Office of Research and Analysis.

[18] Strayer et al., 2012.

[19] Strayer et al., 2012.

[20] Castner, L. & Henke, J. (2011). *Benefit Redemption Patterns in the Supplemental Nutrition Assistance Program*. Alexandria, VA: U.S. Department of Agriculture, Food and Nutrition Service, Office of Research and Analysis.

[21] U.S. Department of Agriculture, Food and Nutrition Service. (2013b). *Supplemental Nutrition Assistance Program – Eligibility*. Available at: http://www.fns.usda.gov/snap/applicant_recipients/eligibility.htm. Accessed on January 7, 2013.

[22] U.S. Department of Agriculture, Food and Nutrition Service, 2013b.

[23] Strayer et al., 2012.

[24] Strayer et al., 2012.

[25] U.S. Department of Agriculture, Food and Nutrition Service, 2013a.

[26] DeNavas-Walt, C., Proctor, B. D., & Smith, J. C. (2012). *Income, Poverty, and Health Insurance Coverage in the United States: 2011*. U.S. Census Bureau, Current Population Reports, P60-243. Washington, DC: U.S. Government Printing Office.

[27] DeNavas-Walt et al., 2012.

[28] Cohen, R. A. & Martinez, M. E. (2012). *Health Insurance Coverage: Early Release of Estimates From the National Health Interview Survey, January – March 2012*. Available at: http://www.cdc.gov/nchs/data/nhis/earlyrelease/insur201209.pdf. Accessed on January 7, 2013.

[29] DeNavas-Walt et al., 2012.

[30] National Center for Health Statistics. (2012). *Health, United States, 2011: With Special Feature on Socioeconomic Status and Health*. Hyattsville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics.

[31] Beaulac, J., Kristjansson, E., & Cummins, S. (2009). A systematic review of food deserts, 1966-2007. *Preventing Chronic Disease*, 6(3), A105.

[32] Larson, N. I., Story, M. T., & Nelson, M. C. (2009). Neighborhood environments: disparities in access to healthy foods in the U.S. *American Journal of Preventive Medicine*, 36(1), 74-81.

[33] Moore, L. V., Diez Roux, A. V., Evenson, K. R., McGinn, A. P., & Brines, S. J. (2008). Availability of recreational resources in minority and low socioeconomic status areas. *American Journal of Preventive Medicine*, 34(1), 16-22.

[34] Powell, L. M., Slater, S., & Chaloupka, F. J. (2004). The relationship between community physical activity settings and race, ethnicity, and socioeconomic status. *Evidence-Based Preventive Medicine*, 1(2), 135-144.

[35] Evans, G. W. & Kantrowitz, E. (2002). Socioeconomic status and health: the potential role of environmental risk exposure. *Annual Review of Public Health*, 23, 303-331.

[36] Cohen, S., Janicki-Deverts, D., Chen, E., & Matthews, K. A. (2010). Childhood socioeconomic status and adult health. *Annals of the New York Academy of Sciences*, 1186, 37-55.
[37] Coleman-Jensen et al., 2012.
[38] Singh, G. K., Siahpush, M., & Kogan, M. D. (2010). Rising social inequalities in U.S. childhood obesity, 2003-2007. *Annals of Epidemiology*, 20(1), 40-52.
[39] Skelton, J. A., Cook, S. R., Auinger, P., Klein, J. D., & Barlow, S. E. (2009). Prevalence and trends of severe obesity among U.S. children and adolescents. *Academic Pediatrics*, 9(5), 322-329.
[40] Ali, M. K., Bullard, K. M., Beckles, G. L., Stevens, M. R., Barker, L., Narayan, K. M., & Imperatore, G. (2011). Household income and cardiovascular disease risks in U.S. children and young adults: analyses from NHANES 1999-2008. *Diabetes Care*, 34(9), 1998-2004.
[41] da Fonseca, M. A. (2012). The effects of poverty on children's development and oral health. *Pediatric Dentistry*, 34(1), 32-38.
[42] Edelstein, B. L. (2002). Disparities in oral health and access to care: findings of national surveys. *Ambulatory Pediatrics*, 2(2 Suppl), 141-147.
[43] National Center for Health Statistics, 2012.
[44] Engle, P. L. & Black, M. M. (2008). The effect of poverty on child development and educational outcomes. *Annals of the New York Academy of Sciences,* 1136, 243-256.
[45] National Center for Health Statistics, 2012.
[46] Fryar, C. D., Merino, M. C., Hirsch, R., & Porter, K. S. (2009). Smoking, alcohol use, and illicit drug use reported by adolescents aged 12–17 years: United States, 1999 - 2004. *National Health Statistics Reports*, 15. Hyattsville, MD: National Center for Health Statistics.
[47] Braveman, P. & Barclay, C. (2009). Health disparities beginning in childhood: a life-course perspective. *Pediatrics*, 125, S163-S175.
[48] Cohen et al., 2010.
[49] Evans, G. W. & Schamberg, M. A. (2009). Childhood poverty, chronic stress, and adult working memory. *Proceedings of the National Academy of Sciences of the United States of America*, 106(16), 6545-6549.
[50] Anderson Moore, K., Redd, Z., Burkhauser, M., Mbwana, K., & Collins, A. (2009). Children in poverty: trends, consequences, and policy options. *Child Trends Research Brief*, 2009-11. Washington, DC: Child Trends.
[51] Holzer, H. J., Whitmore Schanzenbach, D., Duncan, G. J., & Ludwig, J. (2007). *The Economic Costs of Poverty in the United States: Subsequent Effects of Children Growing Up Poor.* Washington, DC: Center for American Progress.
[52] Food Research and Action Center. (2010). *Do the Data Show A Relationship between Obesity and Poverty?* Washington, DC: Food Research and Action Center.
[53] Levine, J. A. (2011). Poverty and obesity in the U.S. *Diabetes*, 60(11), 2667-2668.
[54] National Center for Health Statistics, 2012.
[55] Roger et al., 2012.
[56] Black, M. M., Quigg, A. M., Cook, J., Casey, P. H., Cutts, D. B., Chilton, M., Meyers, A., Ettinger de Cuba, S., Heeren, T., Coleman, S., Rose-Jacobs, R., & Frank, D. A. (2012). WIC participation and attenuation of stress-related child health risks of household food insecurity and caregiver depressive symptoms. *Archives of Pediatrics and Adolescent Medicine*, 166(5), 444-451.
[57] Moore, C. J. & Cunningham, S. A. (2012). Social position, psychological stress, and obesity: a systematic review. *Journal of the Academy of Nutrition and Dietetics*, 112(4), 518-526.
[58] Muennig, P., Fiscella, K., Tancredi, D., & Franks, P. (2010). The relative health burden of selected social and behavioral risk factors in the United States: implications for policy. *American Journal of Public Health*, 100(9), 1758-1764
[59] Coleman-Jensen et al., 2012.
[60] Seligman, H. K., Bindman, A. B., Vittinghoff, E., Kanaya, A. M., & Kushel, M. B. (2007). Food insecurity is associated with diabetes mellitus: Results from the National Health Examination and Nutrition Examination Survey (NHANES) 1999–2002. *Journal of General Internal Medicine*, 22(7), 1018-1023.
[61] Fitzgerald, N., Hromi-Fiedler, A., Segura-Pérez, S., & Pérez-Escamilla, R. (2011). Food insecurity is related to increased risk of type 2 diabetes among Latinas. *Ethnicity and Disease*, 21(3), 328-334.
[62] Vozoris, N. T. & Tarasuk, V. S. (2003). Household food insufficiency is associated with poorer health. *Journal of Nutrition*, 133, 120-126.
[63] Heflin, C. M., Siefert, K., & Williams, D. R. (2005). Food insufficiency and women's mental health: Findings from a 3-year panel of welfare recipients. *Social Science and Medicine*, 61, 1971-1982.
[64] Siefert, K., Heflin, C. M., Corcoran, M. E., & Williams, D. R. (2004). Food insufficiency and physical and mental health in a longitudinal survey of welfare recipients. *Journal of Health and Social Behavior*, 45(2), 171-186.
[65] Eisenmann, J. C., Gundersen, C., Lohman, B. J., Garasky, S., & Stewart, S. D. (2011). Is food insecurity related to overweight and obesity in children and adolescents? A summary of studies, 1995-2009. *Obesity Reviews*, 12(5), e73-e83.
[66] Larson, N. I. & Story, M. T. (2011). Food insecurity and weight status among U.S. children and families: a review of the literature. *American Journal of Preventive Medicine*, 40(2), 166-173.
[67] Laraia, B. A., Siega-Riz, A. M., & Gundersen, C. (2010). Household food insecurity is associated with self-reported pregravid weight status, gestational weight gain, and pregnancy complications. *Journal of the American Dietetic Association*, 110(5), 692-701.
[68] Lee, J. S., Fischer, J. G., & Johnson, M. A. (2010). Food insecurity, food and nutrition programs, and aging: experiences from Georgia. *Journal of Nutrition for the Elderly*, 29(2), 116-149.
[69] Ziliak, J. P., Gundersen, C., & Haist, M. (2008). *The Causes, Consequences, and Future of Senior Hunger in America*. Lexington, KY: University of Kentucky Center for Poverty Research.
[70] Biros, M. H., Hoffman, P. L., & Resch, K. (2005). The prevalence and perceived health consequences of hunger in emergency department patient populations. *Academic Emergency Medicine*, 12, 310-317.
[71] Sullivan, A. F., Clark, S., Pallin, D J., & Camargo, C. A. (2010). Food security, health, and medication expenditures of emergency department patients. *The Journal of Emergency Medicine*, 38(4), 524-528.
[72] Kushel, M. B., Gupta, R., Gee, L., & Haas, J. S. (2006). Housing instability and food insecurity as barriers to health care among low-income Americans. *Journal of General Internal Medicine*, 21, 71-77.
[73] Ma, C. T., Gee, L., & Kushel, M. B. (2008). Associations between housing instability and food insecurity with health care access in low-income children. *Ambulatory Pediatrics*, 8, 50-57.

[74] Burkhardt, M. C., Beck, A. F., Kahn, R. S., & Klein, M. D. (2012). Are our babies hungry? Food insecurity among infants in urban clinics. *Clinical Pediatrics*, 51(3), 238-243.
[75] Seligman, H. K., Jacobs, E. A., López, A., Tschann, J., & Fernandez, A. (2012). Food insecurity and glycemic control among low-income patients with type 2 diabetes. *Diabetes Care*, 35(2), 233-238.
[76] Kushel et al., 2006.
[77] Nelson, K., Cunningham, W., Andersen, R., Harrison, G., & Gelberg, L. (2001). Is food insufficiency associated with health status and health care utilization among adults with diabetes? *Journal of General Internal Medicine*, 16, 404-411.
[78] Cook, J. T., Black, M., Chilton, M., Cutts, D., Ettinger de Cuba, S., Heeren, T. C., Rose-Jacobs, R., Sandel, M., Casey, P. H., Coleman, S., Weiss, I., & Frank, D. A. (2013). Are food insecurity's health impacts underestimated in the U.S. population? Marginal food security also predicts adverse health outcomes in young U.S. children and mothers. *Advances in Nutrition*, 4(1), 51-61.
[79] Lee, J. S., Gundersen, C., Cook, J., Laraia, B., & Johnson, M. A. (2012). Food insecurity and health across the lifespan. *Advances in Nutrition*, 3(5), 744-745.
[80] Murphy, C., Ettinger de Cuba, S., Cook, J., Cooper, R., & Weill, J. D. (2008). *Reading, Writing and Hungry: The consequences of food insecurity on children, and on our nation's economic success.* Washington, DC: Partnership for America's Economic Success.
[81] Nord, M. (2009). Food insecurity in households with children: prevalence, severity, and household characteristics. *Economic Information Bulletin*, 56. Washington, DC: U.S. Department of Agriculture, Economic Research Service.
[82] Nord, M. & Parker, L. (2010). How adequately are food needs of children in low-income households being met? *Children and Youth Services Review*, 32(9), 1175-1185.
[83] Ryu, J. H. & Bartfeld, J. S. (2012). Household food insecurity during childhood and subsequent health status: the early childhood longitudinal study - kindergarten cohort. *American Journal of Public Health*, 102(11), e50-e55.
[84] Devaney, B. (1992). *Very Low Birthweight Among Medicaid Newborns in Five States: The Effects of Prenatal WIC Participation*. Alexandria, VA: U.S. Department of Agriculture, Food and Nutrition Service, Office of Analysis and Evaluation.
[85] Hromi-Fiedler, A., Bermúdez-Millán, A., Chapman, D., Segura-Pérez, S., Damio, G., Melgar-Quiñonez, H., & Pérez-Escamilla, R. (2008). Household food security status before pregnancy as a risk factor for delivering a low birthweight infant [abstract]. *The FASEB Journal*, 22, 36.1.
[86] Carmichael, S. L., Yang, W., Herring, A., Abrams, B., & Shaw, G. M. (2007). Maternal food insecurity is associated with increased risk of certain birth defects. *Journal of Nutrition*, 137(9), 2087-2092.
[87] Skalicky, A., Meyers, A. F., Adams, W. G., Yang, Z., Cook, J. T., & Frank, D. A. (2006). Child food insecurity and iron deficiency anemia in low-income infants and toddlers in the United States. *Maternal and Child Health Journal*, 10(2), 177-185.
[88] Alaimo, K., Olson, C. M., Frongillo, E. A. Jr., & Briefel, R. R. (2001). Food insufficiency, family income, and health in U.S. preschool and school-aged children. *American Journal of Public Health*, 91(5), 781-786.
[89] Rose-Jacobs, R., Black, M. M., Casey, P. H., Cook, J. T., Cutts, D. B., Chilton, M., Heeren, T., Levenson, S. M., Meyers, A. F., & Frank, D. A. (2008). Household food insecurity: associations with at-risk infant and toddler development. *Pediatrics*, 121(1), 65-72.
[90] Alaimo, K., Olson, C. M., & Frongillo, E. A. (2002). Family food insufficiency, but not low family income, is positively associated with dysthymia and suicide symptoms in adolescents. *Journal of Nutrition*, 132, 719–725.
[91] Weinreb, L., Wehler, C., Perloff, J., Scott, R., Hosmer, D., Sagor, L., & Gundersen, C. (2002). Hunger: its impact on children's health and mental health. *Pediatrics*, 110, e41.
[92] McLaughlin, K. A., Green, J. G., Alegría, M., Jane Costello, E., Gruber, M. J., Sampson, N. A., & Kessler, R. C. (2012). Food insecurity and mental disorders in a national sample of U.S. adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*, 51(12), 1293-1303.
[93] Alaimo, K., Olson, C. M., Frongillo, E. A. Jr. (2001). Food insufficiency and American school-aged children's cognitive, academic and psychosocial development. *Pediatrics*, 108(1), 44-53.
[94] Jyoti, D. F., Frongillo, E. A., & Jones, S. J. (2005). Food insecurity affects school children's academic performance, weight gain, and social skills. *Journal of Nutrition*, 135, 2831-2839.
[95] Dietary Guidelines Advisory Committee. (2010). *Report of the Dietary Guidelines Advisory Committee on the Dietary Guidelines for Americans, 2010, to the Secretary of Agriculture and the Secretary of Health and Human Services.* Washington, DC: U.S. Department of Agriculture, Agricultural Research Service.
[96] Fungwe, T., Guenther, P. M., Juan, W., Hiza, H., & Lino, M. (2009). The quality of children's diets in 2003-04 as measured by the Healthy Eating Index-2005. *Nutrition Insight*, 43. Alexandria, VA: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion.
[97] Guenther, P. M., Juan, W., Lino, M., Hiza, H. A., Fungwe, T., & Lucas. (2008). Diet quality of low-income and higher income Americans in 2003-04 as measured by the Healthy Eating Index-2005. *Nutrition Insight*, 42. Alexandria, VA: U.S. Department of Agriculture, Center for Nutrition Policy and Promotion.
[98] Hiza, H. A., Casavale, K. O., Guenther, P. M., & Davis, C. A. (2012). Diet quality of Americans differs by age, sex, race/ethnicity, income, and education level. *Journal of the Academy of Nutrition and Dietetics*, Epub ahead of print (November 15, 2012).
[99] Dietary Guidelines Advisory Committee, 2010.
[100] Dietary Guidelines Advisory Committee, 2010.
[101] Lozoff, B. & Georgieff, M. K. (2006). Iron deficiency and brain development. *Seminars in Pediatric Neurology*, 13(3):158-165.
[102] Scholl, T. O. (2011). Iron status during pregnancy: setting the stage for mother and infant. *American Journal of Clinical Nutrition*, 81(5), 1218S-1222S.
[103] Daniels, S. R. (2009). Complications of obesity in children and adolescents. *International Journal of Obesity*, 33(Supplement 1), S60-S65.
[104] Nguyen, N. T., Magno, C. P., Lane, K. T., Hinojosa, M. W., & Lane, J. S. (2008). Association of hypertension, diabetes, dyslipidemia, and metabolic syndrome with obesity: findings from the National Health and Nutrition Examination Survey, 1999 to 2004. *Journal of the American College of Surgeons*, 207(6), 928-934.
[105] Guh, D. P., Zhang, W., Bansback, N., Amarsi, Z., Birmingham, C. L., & Anis, A. H. (2009). The incidence of co-morbidities related to obesity and overweight: a systematic review and meta-analysis. *BioMed Central Public Health*, 9, 88.
[106] Daniels, 2009.
[107] Nguyen et al., 2008.
[108] Practice Committee of the American Society for Reproductive Medicine. (2008). Obesity and reproduction: an educational bulletin. *Fertility and Sterility*, 90, S21–S29.

[109] Fontaine, K. R., Redden, D. T., Wang, C., Westfall, A. O., & Allison, D. B. (2003). Years of life lost due to obesity. *Journal of the American Medical Association*, 289(2), 187-193.
[110] McHugh, M. K., Symanski, E., Pompeii, L. A., & Delclos, G. L. (2009). Prevalence of asthma among adult females and males in the United States: results from the National Health and Nutrition Examination Survey (NHANES), 2001-2004. *Journal of Asthma*, 46(8), 759-766.
[111] Story, R. E. (2007). Asthma and obesity in children. *Current Opinion in Pediatrics*, 19(6), 680-684.
[112] Mustillo, S., Worthman, C., Erkanli, A., Keeler, G., Angold, A., & Costello, E. J. (2003). Obesity and psychiatric disorder: developmental trajectories. *Pediatrics*, 111(4 Part 1), 851-859.
[113] Petry, N. M., Barry, D., Pietrzak, R. H., & Wagner, J. A. (2008). Overweight and obesity are associated with psychiatric disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Psychosomatic Medicine*, 70(3), 288-297.
[114] Puhl, R. M., Moss-Racusin, C. A., Schwartz, M. B., & Brownell, K. D. (2008). Weight stigmatization and bias reduction: perspectives of overweight and obese adults. *Health Education Research*, 23(2), 347-358.
[115] van den Berg, P., Neumark-Sztainer, D., Eisenberg, M. E., & Haines, J. (2008). Racial/ethnic differences in weight-related teasing in adolescents. *Obesity*, 16(Supplement 2), S3-S10.
[116] Hartline-Grafton, H. (2011). *Food Insecurity and Obesity: Understanding the Connections.* Washington, DC: Food Research and Action Center.
[117] Hartline-Grafton, 2011.
[118] U.S. Census Bureau. (2012). *Income, Poverty, and Health Insurance Coverage: 2011*. Webinar. Available at: http://www.census.gov/newsroom/releases/pdf/20120912_ip_%20slides_noplotpoints.pdf. Accessed on January 7, 2013.
[119] Strayer et al., 2012.
[120] Tiehen, L., Jolliffe , D., & Gundersen, C. (2012). Alleviating poverty in the United States: The critical role of SNAP benefits. *Economic Research Report*, 132. Washington, DC: U.S. Department of Agriculture, Economic Research Service.
[121] Nord, M. & Prell, M. (2011). Food security improved following the 2009 ARRA increase in SNAP benefits. *Economic Research Report*, 116. Washington, DC: U.S. Department of Agriculture, Economic Research Service.
[122] Kreider, B., Pepper, J. V., Gundersen, C., & Jolliffe, D. (2012). Identifying the effects of SNAP (Food Stamps) on child health outcomes when participation is endogenous and misreported. *Journal of the American Statistical Association*, 107(499), 958-975.
[123] Vericker, T. & Mills, G. (2012). *Childhood Food Insecurity: The Mitigating Role of SNAP*. Washington, DC: Urban Institute.
[124] Perry, A., Ettinger de Cuba, S., Cook, J., & Frank, D. A. (2007). *Food Stamps as Medicine: A New Perspective on Children's Health*. Boston, MA: Children's HealthWatch.
[125] Jones, S. J., Jahns, L., Laraia, B. A., & Haughton, B. (2003). Lower risk of overweight in school-aged food insecure girls who participate in food assistance: results from the Panel Study of Income Dynamics Child Development Supplement. *Archives of Pediatric and Adolescent Medicine*, 157(8), 780-784.
[126] Webb, A. L., Schiff, A., Currivan, D., & Villamor, E. (2008). Food Stamp Program participation but not food insecurity is associated with higher adult BMI in Massachusetts residents living in low income neighbourhoods. *Public Health Nutrition*, 11(12), 1248-1255.
[127] Karnik, A., Foster, B. A., Mayer, V., Pratomo, V., McKee, D., Maher, S., Campos, G., & Anderson, M. (2011). Food insecurity and obesity in New York City primary care clinics. *Medical Care*, 49(7), 658-661.
[128] Institute of Medicine. (2009). *Local Government Actions to Prevent Childhood Obesity*. Washington, DC: The National Academies Press.
[129] Institute of Medicine. (2011). *Early Childhood Obesity Prevention Policies*. Washington, DC: The National Academies Press.
[130] Basiotis, P. P., Kramer-LeBlanc, C. S., & Kennedy, E. T. (1998). Maintaining nutrition security and diet quality: the role of the Food Stamp Program and WIC. *Family Economics and Nutrition Review*, 11(1 & 2), 4-16.
[131] Rose, D., Habicht, J. P., & Devaney, B. (1998). Household participation in the Food Stamp and WIC programs increases the nutrient intakes of preschool children. *Journal of Nutrition*, 128(3), 548-555.
[132] Lee, B. J., Mackery-Bilaver, L., & Chin, M. (2006). Effects of WIC and Food Stamp Program participation on child outcomes. *Contractor and Cooperator Report*, 27. Washington, DC: U.S. Department of Agriculture, Economic Research Service.
[133] Hoynes et al., 2012.
[134] Agénor, M., Ettinger de Cuba, S., Rose-Jacobs, R., & Frank, D. A. (2006). *Protecting the Health and Nutrition of Young Children of Color: The Impact of Nutrition Assistance and Income Support Programs*. Prepared for the Joint Center for Political and Economic Studies Health Policy Institute. Washington, DC: Joint Center for Political and Economic Studies.
[135] Lee et al., 2006.
[136] Cook, J. T., Frank, D. A., Levenson, S. M., Neault, N. B., Heeren, T. C., Black, M. M., Berkowitz, C., Casey, P. H., Meyers, A. F., Cutts, D. B., & Chilton, M. (2006). Child food insecurity increases risks posed by household food insecurity to young children's health. *Journal of Nutrition*, 136(4), 1073-1076.
[137] Ettinger de Cuba, S., Weiss, I., Pasquariello, J., Schiffmiller, A., Frank, D. A., Coleman, S., Breen, A., & Cook, J. (2012). *The SNAP Vaccine: Boosting Children's Health.* Boston, MA: Children's HealthWatch.
[138] Kim, K. & Frongillo, E. A. (2007). Participation in food assistance programs modifies the relation of food insecurity with weight and depression in elders. *Journal of Nutrition*, 137, 1005-1010.
[139] Nord & Prell, 2011.
[140] Castner & Henke, 2011.
[141] Collins, A., Briefel, R., Klerman, J. A., Bell, S., Bellotti, J., Logan, C. W., Gordon, A., Wolf, A., Rowe, G., McLaughlin, S. M, Enver, A., Fernandes, M., Wolfson, C., Komarovksy, M., Cabili, C., & Owens, C. (2012). *Summer Electronic Benefits Transfer for Children: Evaluation Findings for the Proof-of-Concept Year.* Prepared by Abt Associates, Mathematica Policy Research, and Maximus under Contract No. AG-3198-C-11-002. Alexandria, VA: U.S. Department of Agriculture, Food and Nutrition Service.
[142] March, E. L., Ettinger de Cuba, S., Bailey, K., Cook, J., Coleman, S., Schiffmiller, A., & Frank, D. A. (2011). *Boost to SNAP Benefits Protected Young Children's Health*. Boston, MA: Children's HealthWatch.
[143] Basiotis et al., 1998.
[144] Mabli, J., Castner, L., Ohls, J., Fox, M. K., Crepinsek, M. K., & Condon, E. (2010). *Food Expenditures and Diet Quality Among Low-Income Households and Individuals*. Report to the U.S. Department of Agriculture, Food and Nutrition Service. Washington, DC: Mathematica Policy Research, Inc.

[145] Jilcott, S. B., Liu, H., Dubose, K. D., Chen, S., & Kranz, S. (2011). Food Stamp participation is associated with fewer meals away from home, yet higher body mass index and waist circumference in a nationally representative sample. *Journal of Nutrition Education and Behavior*, 43(2), 110-115.

[146] Jilcott, S. B., Wall-Bassett, E. D., Burke, S. C., & Moore, J. B. (2011). Associations between food insecurity, Supplemental Nutrition Assistance Program (SNAP) benefits, and body mass index among adult females. *Journal of the American Dietetic Association*, 111(11), 1741-1745.