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Perceived Adult/Child Health and Diet by SNAP Usage and Food Security in a Rural, Appalachian Mississippi Community

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Perceived Adult/Child Health and Diet by SNAP Usage and Food Security
in a Rural, Appalachian Mississippi Community

By
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A thesis submitted to the faculty of The University of Mississippi in partial fulfillment of the requirements of the Sally McDonnell Barksdale Honors College.

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DEDICATION

This thesis is dedicated to everyone who guided and encouraged me throughout the year. Thank you.

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ABSTRACT

This study examined if there were differences in perceived adult health score, perceived adult diet score, parent-perceived child health score, and parent-perceived child diet score by SNAP usage and food security in a rural, Appalachian Mississippi community. Adults (n=1084) with elementary school- aged children were surveyed in a rural, Appalachian Mississippi school district. Demographic, household adult food security (USDA 10-item measure), and perceived health and dietary data were collected. Using IBM SPSS version 24, demographic statistics were calculated to summarize data. Independent samples t-test and one-way ANOVA with Tukey post-hoc test was utilized to assess for differences between groups. $P<.05$ was utilized for statistical significance. A total of 190 adults returned complete surveys (17.5% response rate). Participants were 35±9 years of age, with children 7±2 years of age. Participants were predominantly White (n=127), female (n=178, 94.7%), non-SNAP users (n=121, 63.7%), and food secure (n=142, 74.7%). No differences in perceived adult health or diet scores or parent-perceived child health or diet scores were observed ($p>.05$) between SNAP and non-SNAP users. However, perceived adult health ($p=.004$) and parent-perceived child diet ($p=.014$) scores were lower for food insecure SNAP users, compared to food secure non-SNAP users. Perceived adult health and parent- perceived child diet scores are lower in food insecure SNAP users, compared to food secure non-SNAP users in a rural Appalachian Mississippi community. Exploring interventions collaboratively with community members to improve food security is warranted.

PREFACE

This thesis examined if there were differences in perceived adult health score, perceived adult diet score, parent-perceived child health score, and parent-perceived child diet score by SNAP usage and food security in a rural, Appalachian Mississippi community.

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LIST OF ABBREVIATIONS

SNAP	Supplemental Nutrition Assistance Program
USDA	United States Department of Agriculture
WIC	Women, Infants, and Children

CHAPTER I. INTRODUCTION

Food insecurity is defined as the household-level economic and social condition of limited or uncertain access to adequate food; hunger is a potential consequence of food insecurity (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2018). It is related to poor diet quality and chronic disease risk and prevalence in the United States (Dixon, Winkleby, & Radimer, 2001; Holben & Berger-Marshall, 2017; Gregory & Coleman-Jensen, 2018). Complications of food insecurity include inadequate produce intake, increased risk for development of chronic disease because of low serum nutrient values, and poor physical and psychological health and well-being (Holben & Berger-Marshall, 2017; Dixon et al., 2001). In 2017, 10.5 percent of all U.S. households were food insecure at least some time during the year, including 4.1 percent with very low food security (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2018). According to Table 3, Mississippi had over 1.1 million households experiencing food insecurity at some time in 2015-2017. In 2017, Mississippi was among 12 states that possessed very low food security (Coleman-Jensen et al., 2018).

In order to combat food insecurity, the Supplemental Nutrition Assistance program, otherwise known as the federally-funded SNAP, was designed to "alleviate hunger and improve nutrition by increasing the food purchasing power of low-income households" and is targeted at households with a gross monthly income of 130 percent of the U.S. poverty line (USDA, 2020). It is based upon a monthly benefit allotment for each household that depends on the monthly income provided by each household. The starting quote for benefits begins at 30 percent of each

monthly income amount considering households already use an average 30 percent of its resources on food. These benefits can be spent using an EBT card, Electronic Benefits Transfer, at all authorized SNAP retailers. SNAP retailers usually consist of farmers' markets, grocery stores, convenience stores, and gas station markets. In the United States, however, not all eligible venues including grocery stores and farmers markets accept SNAP benefits (USDA, 2020).

SNAP provided assistance to 43.2 percent of food-insecure households, contributing to the 58 percent of food-insecure households that reported receiving assistance from one or more Federal nutrition assistance programs during the month prior to December 2019 (Meyer and Mittag, 2019). An estimated 57.7 percent of households classified as having very low food security reported participating in those same federal nutrition assistance programs, with the largest share (47.8 percent) participating in SNAP (Coleman-Jensen et al., 2018). Further information on food security qualifications can be found in Appendix A.

According to 2017 estimates, households in the Southern region have possessed double the amount of food insecurity compared to the other regions in the U.S., with Mississippi leading at 15.7 percent food insecure (Coleman-Jensen et al., 2018). Between the years of 2016 and 2018, the state of Mississippi has increased in food insecurity by 6.3 percent according to the USDA. The USDA also published a journal by ERS researchers that limited their research to study how food insecurity affects diet quality (Mancino & Gregory, 2020). They found that food insecure, low-income households fall far below recommendations for total diet and dietary components (Mancino & Gregory, 2020).

In 2017, 11.8 percent of households were food insecure at least some time during the year, including 4.5 percent with very low food security (Coleman-Jensen et al., 2018). This means that food intake of one or more household members substantially decreased and eating

patterns were disrupted because resources such as money and other resources for obtaining food were lacking. In 2017, the typical food-secure household spent 23 percent more on food than the typical food-insecure household of the same size and household composition (Coleman-Jensen et al., 2018). Though most U.S. households have consistent, dependable access to enough food, there still remains a large quantity of Americans without proper access to sustaining food resources.

This thesis examined if there were differences in perceived adult health score, perceived adult diet score, parent-perceived child health score, and parent-perceived child diet score by SNAP usage and food security in a rural, Appalachian Mississippi community.

Table 1

Research Questions and Null Hypothesis of the Study

Research Question	Null Hypothesis
Does the perceived health of adults differ by SNAP usage and food security?	The perceived health of adults will differ by SNAP usage and food security.
Does the perceived diet of adults differ by SNAP usage and food security?	The perceived diet of adults will differ by SNAP usage and food security.
Does parent-perceived child health differ by SNAP usage and food security?	The parent-perceived child health will differ by SNAP usage and food security.

Does parent-perceived child diet differ by SNAP usage and food security?	The parent-perceived child diet will differ between SNAP participants and non-participants.

CHAPTER II. REVIEW OF LITERATURE

This thesis examined if there were differences in perceived adult health score, perceived adult diet score, parent-perceived child health score, and parent-perceived child diet score by SNAP usage and food security in a rural, Appalachian Mississippi community.

Food Security

Food Security is the access by all people at all times to enough food for an active and health life (USDA, 2020). In contrast, food insecurity is defined as a household-level economic and social condition of limited or uncertain access to adequate food; hunger is a potential consequence of food insecurity (USDA, 2020). The status of food security is determined by household well-being and can be used in research to assess health perception and diet quality as compared to other households. Table 2 summarizes food security characteristics as determined by the household, adult food security module (Appendix A).

This review of literature summarizes food security and food insecurity in U.S. households during the time frame of this study (2017). Households that are categorized as having high food security or marginal food security are classified as food-secure and households that are categorized as having low food security or very low food security are classified as food-insecure. Food insecurity is the limited or uncertain ability to acquire acceptable foods in socially acceptable ways (USDA, 2020). According to Figure 1, based on the 2017 food security estimates for the United States, 15.7 percent of the U.S. population with children (non-institutionalized) were considered food insecure (Coleman-Jensen et al., 2018).

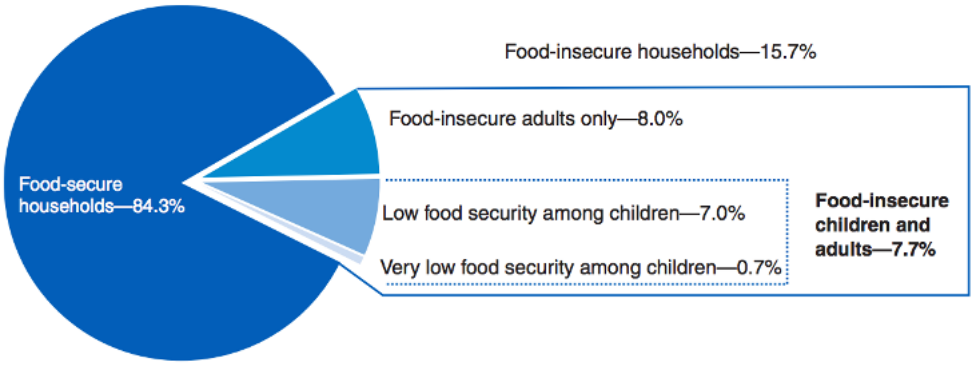
Table 2

Food Security Categories and Corresponding Characteristics

Food Security Categories	Characteristics*
High Food Security	Households had no problems or anxiety about, consistently accessing adequate food.
Marginal Food Security	Households had problems at times, or anxiety about, accessing adequate food, but the quality, variety, and quantity of their food intake were not substantially reduced.
Low Food Security	Households reduced the quality, variety, and desirability of their diets, but the quantity of food intake and normal eating patterns were not substantially disrupted.
Very Low Food Security	At times during the year, eating patterns of one or more household members were disrupted and food intake reduced because the household lacked money and other resources for food.

*Placement on this continuum is determined by the household's responses to a series of questions about behaviors and experiences associated with difficulty in meeting food needs. (USDA, 2006)

Figure 1. *U.S. Households with Children by Food Security Status of Adults and Children, 2017*



Source: USDA, Economic Research Service using data from U.S. Department of Commerce, U.S. Census Bureau, 2017 Current Population Survey Food Security Supplement

Monitoring food secure and food-insecure households in the U.S. provides information about the prevalence and extremity of food security to assist Federal nutrition assistance programs and other government initiatives.

Food Security in the United States

Food security is determined annually by a supplemental survey to the Current Population Survey (CPS) distributed by the United States Census Bureau. The survey consists of 10 to 18 questions that examine household spending and how it relates to food consumption over the previous 12 months. Most households of the general population answer only three of these questions, or five if it is a household with children. Overall 10.5 percent of all U.S. households were food insecure at least some time during 2017, including 4.1 percent with very low food security (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2018).

Rates of food insecurity were higher than the national average for the following groups: households with incomes near or below the Federal poverty line, including those with incomes below 185 percent of the poverty line; all households with children and particularly households

with children headed by single women or single men; women and men living alone; Black-and Hispanic- headed households; and households in principal cities and nonmetropolitan areas (Coleman-Jensen, 2018).

Food Insecure Household Characteristics

Some households may be prone to food insecurity. The USDA reports that the prevalence of food insecurity in households with children headed by a single woman is 31.6 percent, while households with children headed by a single man is 21.7 percent. In addition, the USDA also reports that households with children have a substantially higher rate of food insecurity (16.5 percent), compared to those without children (10.5 percent). From a regional perspective, food insecurity rates are highest in the South at 13.5 percent, compared to the Northeast (10.8 percent), West (11.5 percent), and Midwest (12.2 percent) (Coleman-Jensen et al., 2018). Regional considerations contribute to the discussion of food insecurity, as Mississippi sits in the deep, rural South and could have an effect on how food insecurity is viewed and culturally defined (Antolini, 2018). The prevalence of food insecurity in 2017 by state is summarized in Table 3.

Food Insecurity in Mississippi

In 2017, food insecurity in Mississippi was rated the most food insecure state in the United States at 17.2 percent over a three-year (2015-2017) period (Coleman-Jensen, 2018). As summarized in Table 3, Mississippi had over 1.1 million households experiencing food insecurity at some time in 2015-2017. In 2017, Mississippi was among 12 states that possessed very low food security (Coleman-Jensen, 2018).

Table 3

Prevalence of Household Food Insecurity and Very Low Food Security by State in 2017

(Average 2015-2017)

States	Number of households		Food insecurity (low or very low food security)		Very low food security	
	Average 2015-17[1]	Interviewed	Prevalence	Margin of error[2]	Prevalence	Margin of error[2]
	Number	*Number*	*Percent*	*Percentage points*	*Percent*	*Percentage points*
U.S.	126,279,000	118,213	12.3	0.19	4.8	0.12
AK	267,000	1,389	11.6	1.64	3.7 *	0.90
AL	1,961,000	2,332	16.3 *	1.88	7.1 *	1.15
AR	1,214,000	2,143	17.4 *	1.97	6.5 *	1.31
AZ	2,650,000	1,851	13.1	1.47	5.7	0.98
CA	13,967,000	9,034	11.2 *	0.76	4.1 *	0.44
CO	2,359,000	1,327	9.2 *	1.50	3.8	0.99
CT	1,420,000	1,012	12.2	2.00	4.7	1.40
DC	321,000	2,609	11.2	1.15	4.5	0.87
DE	381,000	1,290	11.1	1.54	3.5 *	0.92
FL	8,373,000	4,978	11.9	0.83	4.2 *	0.55
GA	4,015,000	2,783	13.0	1.40	4.4	0.62
HI	485,000	1,504	7.4 *	1.30	2.9 *	0.74
IA	1,297,000	1,464	10.5 *	1.60	4.3	1.07
ID	636,000	1,848	11.0	1.53	4.0	0.82
IL	5,039,000	3,460	11.2	1.04	4.7	0.66
IN	2,650,000	2,024	13.6 *	1.26	5.7	0.94
KS	1,188,000	1,565	13.3	2.27	5.6	1.33
KY	1,777,000	1,586	14.7	2.86	6.1	1.55
LA	1,837,000	2,816	17.3 *	1.32	7.1 *	0.78
MA	2,791,000	2,310	10.2 *	1.21	3.8 *	0.77
MD	2,294,000	1,408	10.4 *	1.73	4.3	1.19
ME	574,000	1,195	14.4	2.66	6.4 *	1.61
MI	4,033,000	2,610	13.6	1.41	6.0 *	0.92
MN	2,209,000	1,571	9.5 *	2.06	3.7	1.10
MO	2,470,000	1,818	12.8	2.02	4.8	1.07
MS	1,167,000	2,445	17.2 *	1.58	6.6 *	0.87
MT	446,000	2,620	11.4	1.04	4.6	0.84
NC	4,096,000	2,655	14.4 *	1.69	5.6	1.10
ND	319,000	1,887	9.0 *	1.10	3.5 *	0.75
NE	759,000	1,443	13.5	1.73	5.4	1.19
NH	538,000	1,688	9.4 *	1.46	3.4 *	0.80
NJ	3,389,000	2,270	8.6 *	1.13	3.0 *	0.63
NM	833,000	2,296	17.9 *	1.38	6.6 *	1.19
NV	1,131,000	1,503	12.4	1.83	5.1	1.17
NY	7,888,000	4,584	10.9 *	0.91	3.9 *	0.48
OH	4,664,000	3,268	13.7 *	1.33	6.1 *	0.81
OK	1,570,000	1,781	15.0 *	1.85	6.4 *	1.41
OR	1,645,000	1,761	12.9	1.45	5.4	1.11
PA	5,199,000	3,130	12.1	1.25	4.0 *	0.70
RI	437,000	1,053	12.4	2.02	5.6	1.32
SC	2,053,000	1,880	11.7	1.74	4.2	0.93
SD	353,000	1,455	11.4	1.82	4.3	1.12
TN	2,673,000	2,377	12.9	1.41	5.7 *	0.87
TX	10,177,000	5,998	14.0 *	0.93	5.8 *	0.66
UT	1,001,000	1,604	10.7	2.07	3.9	1.69
VA	3,208,000	2,258	10.1 *	1.17	4.4	0.86
VT	260,000	1,752	9.8 *	1.25	3.6 *	0.77
WA	2,888,000	2,203	10.8 *	1.21	4.1	0.76
WI	2,380,000	1,937	10.0 *	1.41	3.8 *	0.84
WV	762,000	2,604	14.9 *	1.80	6.2 *	0.75
WY	233,000	1,834	13.2	1.79	5.1	1.07

*Difference from U.S. average was statistically significant with 90-percent confidence (t>1.645). Standard error of differences assumes that there is no correlation between national and individual State estimates.

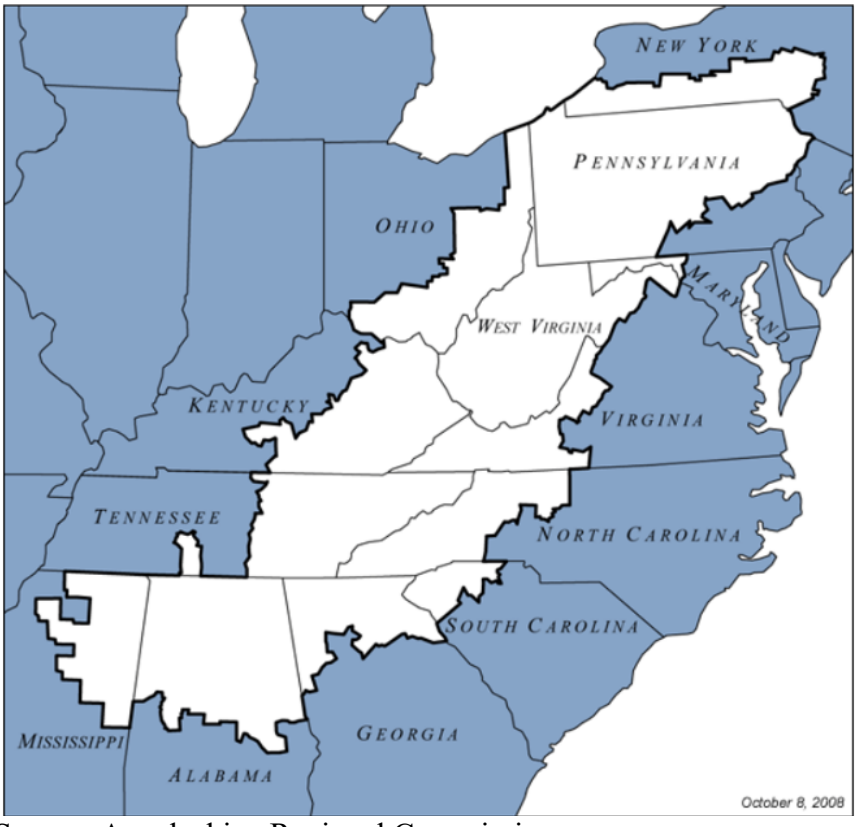
[1]Totals exclude households for which food security status is unknown because household respondents did not give a valid response to any of the questions in the food security scale. These exclusions represent about 0.3 percent of all households in 2015, 0.3 percent in 2016, and 0.3 percent in 2017.
[2]Margin of error with 90-percent confidence (1.645 times the standard error of the estimated prevalence rate). Standard errors were estimated using balanced repeated replication (BRR) methods based on replicate weights for the CPS Food Security Supplement.

Source: USDA, Economic Research Service using data from the U.S. Department of Commerce, U.S. Census Bureau, 2015,2016, and 2017 Current Population Survey (CPS) Food Security Supplements.

The Appalachian Region

The Appalachian region of the U.S. follows the Appalachian mountain range from southern New York to northern Mississippi (Figure 2).

Figure 2. *The Appalachian Region (2008)*



Source: Appalachian Regional Commission

The Appalachian region relies heavily on their mining, forestry, and agricultural industries to support their economies as 40 percent of the region's population is considered rural; as compared to the 20 percent of the overall national population (*The Appalachian Region,* 2017). Each section of the Appalachian region varies in economic risk. Calhoun County, Mississippi, holds a 'distressed' status, meaning it holds the highest rank of composite value, based on a three-year average unemployment rate, per capita market income, and poverty rate (ARC, 2017). Calhoun County, Mississippi, is where the study associated with this thesis was conducted.

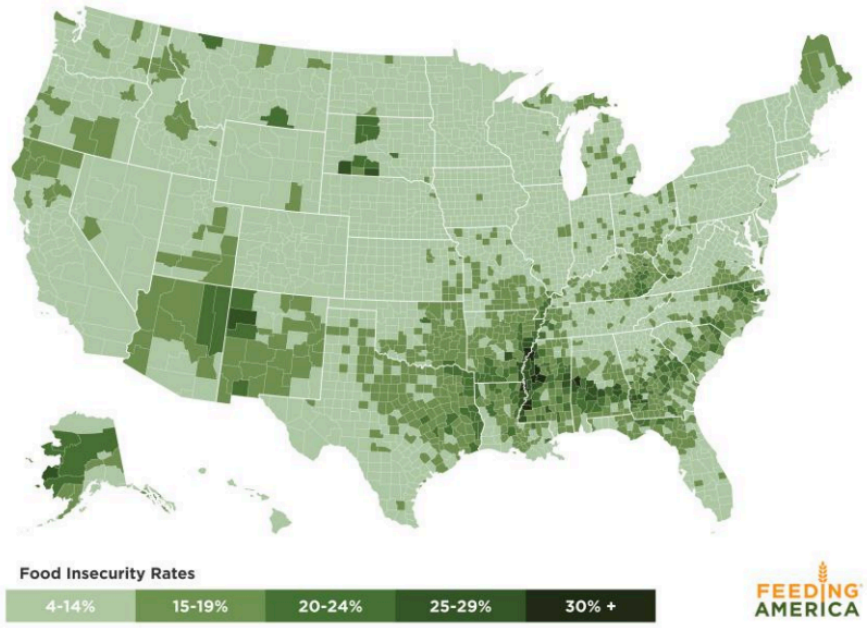
Prevalence of Food Insecurity in Appalachia

The Appalachian Regional Commission (ARC), the regional development agency that represents the 13 Appalachian states, gathers data and statistics in regard to each county's economic status, education, income, population, poverty, and unemployment. However, the agency's data set does not consider food security or health outcomes, such as health and diet quality perceptions (Antolini, 2018), nor do the food security estimates for the United States include food insecurity prevalence for the region. However, other research may give us insight into food insecurity in Appalachia.

As shown in the Map the Meal Gap 2018 map below (Figure 3), portions of the Appalachian region may be prone to food insecurity.

A study conducted in Appalachian Ohio, found that household food insecurity was inversely associated with both perceived health status and social capital among women living in WIC (Supplemental Nutrition Program for Women, Infants, and Children) households (Walker, Holben, Kropf, Holcomb, & Anderson, 2007). Out of the 235 returned surveys, the researchers found that women who participated in WIC were more food insecure (52.6%) than households in the United States and in Ohio, in 2005 (Walker et al., 2007).

Figure 3. *County-Level Food Insecurity in the United States According to the Map the Meal Gap* (2018)



Source: Feeding America

In the Appalachian Ohio region, poverty and proximity to food assistance programs are inversely related to community food security (Bletzacker, Holben, & Holcomb, 2009). In a study of adult women, those living in food insecure households in rural, Appalachian Ohio, had decreased consumption of fruits and vegetables, which may lead to increased rates of chronic disease (Kropf, Holben, Holcomb & Anderson, 2007).

Pheley, Holben, Graham, and Simpson (2002) found that 23 percent of respondents in a rural, Appalachian Ohio community were food insecure at some point in the year, as compared to 10 percent of the national average in that same year. Similarly, another study in a rural, Appalachian Ohio community found that over 30 percent of households experienced food insecurity in the previous 12 months, compared to the 11.1 percent of food insecure households

in the United States (Holben, McClincy, Holcomb, Dean & Walker, 2004). In a rural, Appalachian Kentucky community researchers reported that 23 percent of households were classified as food insecure at some point during the year (Dolstad, Woodward, Green, & McSpirit, 2016), which was nearly double the 12.3 percent of the United States' average.

Federal Food Assistance Programs

As previously noted, in the Appalachian Ohio region, poverty and proximity to food assistance programs are inversely related to community food security (Bletzacker, Holben, & Holcomb, 2009). To combat food insecurity among households in the United States, the government has developed and implemented Federal food assistance programs. Other community-based programs also exist, including Feeding America, as summarized in Table 4.

Table 4

National, Community-based, and Federal Food Assistance Programs and Related Resources

Program	Purpose	Website
USDA[a] Food Atlas	Assembles statistics on food environment factors to stimulate research on determinants of food choices and diet quality.	http://www.ers.usda.gov/data-products/food-environment-atlas.aspx
Feeding America-Map the Meal Gap	Partners with food banks across the U.S. to help food	http://map.feedingamerica.org/

	insecure areas receive adequate meals.	
Child Nutrition Programs: Child and Adult Care Food Program	Provides reimbursements for meals and snacks to eligible children and adults who are enrolled for care at participating childcare centers, day care homes, and adult day care centers.	https://www.fns.usda.gov/cacfp
Fresh Fruit and Vegetable Program	Partners with statewide food distribution agencies to introduce elementary school children to a variety of produce that they otherwise might not have the opportunity to sample.	https://www.fns.usda.gov/ffvp/fresh-fruit-and-vegetable-program
National School Lunch Program	Provides nutritionally balanced, low-cost or free lunches to children each school day.	https://www.fns.usda.gov/nslp

School Breakfast Program	Provides reimbursement to states to operate nonprofit breakfast programs in schools and residential childcare institutions.	https://www.fns.usda.gov/sbp/school-breakfast-program
Special Milk Program	Provides milk to children in schools and childcare institutions who do not participate in other federal meal programs. The program (SMP) reimburses schools for the milk they serve.	https://www.fns.usda.gov/smp/special-milk-program
Summer Foodservice Program	Reimburses program operators who serve free healthy meals and snacks to children and teens in low-income areas.	https://www.fns.usda.gov/sfsp/summer-food-service-program

Food Distribution Programs:

Commodity Supplemental Food Program	Works to improve the health of low-oncome persons at least 60 years of age by supplementing their diets with USDA Foods.	https://www.fns.usda.gov/csfp/commodity-supplemental-food-program
Department of Defense Fresh Fruit and Vegetable Program	Allows schools to use USDA Foods entitlement dollars to buy fresh produce.	https://www.fns.usda.gov/usda-foods/usda-dod-fresh-fruit-and-vegetable-program
Food Distribution Program on Native American Reservations	Provides USDA Foods to income-eligible households living on Native American Reservations and to Native American households residing in designated areas near reservations or in Oklahoma.	https://www.fns.usda.gov/fdpir/food-distribution-program-indian-reservations
The Emergency Food Assistance Program	Helps supplement the diets of low-income Americans by providing them with	https://www.fns.usda.gov/tefap/emergency-food-assistance-program

	emergency food assistance at no cost. The USDA provides 100% American-grown USDA foods and administrative funds.	
Supplemental Nutrition Assistance Program (SNAP)	Provides nutrition benefits to supplement the food budget of low-income families so they can purchase healthy foods and move towards self-sufficiency.	http://www.fns.usda.gov/snap/supplemental-nutrition-assistance-program-snap
The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)	Provides federal grants to states for supplemental foods, health care referrals, and nutrition education for low-income pregnant, breastfeeding, and non-breastfeeding postpartum women, and to infants and children up to age five who	http://www.fns.usda.gov/wic/women-infants-and-children-wic

	are found to be nutritional risk.	
WIC Farmers Market Nutrition Program	WIC participants are eligible for the Farmers Market Nutrition Program's (FMNP) coupons that can be used to buy foods from farmers, farmers' markets or roadside stands that have been approved by the state agency to accept FMNP coupons.	http://www.fns.usda.gov/fmnp/wic-farmers-market-nutrition-program-fmnp
Senior Farmers Market Nutrition Program	Provides low-income seniors with access to locally grown fruits and vegetables.	https://www.fns.usda.gov/sfmnp/senior-farmers-market-nutrition-program
Expanded Food and Nutrition Education Program	Educates low-income populations on proper nutrition in hopes to reduce food insecurity of low-income families.	http://nifa.usda.gov/program/expanded-food-and-nutrition-education-program-efnep

Farm-to-School	Incorporates local foods in the National School Lunch Program and its associated programs, as well as the Summer Food Service Program, and Child and Adult Care Food Program.	http://www.fns.usda.gov/farmtoschool/farm-school
Feeding America	A nationwide network of member food banks that work together to end hunger in the United States.	https://www.feedingamerica.org/

[a]USDA= United States Department of Agriculture

SNAP

SNAP was formerly called the Food Stamp Program. In the study associated with this thesis SNAP usage by participants was examined. To assist the Nation's ongoing issue of food insecurity, the United States Department of Agriculture offers a SNAP to low-income households and individuals whose total monthly income is 130 percent of the poverty line. The term "SNAP" was instated by the 2008 Farm Bill, which pledged to commit more money and effort to the food stamp program over the next 10 years and to remove the stigma around the

phrase “food stamps” with its rebranding (USDA, 2014). In the 2017 fiscal year, $68.0 billion was spent on the Federal Supplemental Nutrition Assistance Program (U.S. Department of Agriculture, 2018).

SNAP is the largest federal food assistance program in the United States (Hudak, Racine & Schulkind, 2021). The goal of the program is to alleviate hunger and malnutrition and enable low-income households to obtain a more nutritious diet (USDA, 2020). SNAP participants are eligible to purchase prepackaged edible foods, regardless of nutritional value. Hot foods (such as those found in a supermarket deli) are ineligible, as well as items in fast food restaurants and similar retail settings, although some exceptions do exist (Becerra, Hasenfeld & Seltzer, 2015). Although SNAP is not intended to meet all dietary needs, other programs designed for food assistance have made changes to promote healthy choices that allow participants to purchase. In 2020, Alexandra Sarkisian did a study on understanding the effects of food security that found that 74.7 percent of those who were food insecure were receiving household SNAP benefits (Sarkisian, 2020).

The SNAP program is considered to be the primary safety net to help low-income households afford a healthy diet and reduce food insecurity (Hudak, Racine, & Schulkind, 2021). SNAP benefits have shown little influence on food security or diet quality, but what the study done by Hudak, Racine, and Schulkind (2021) lacks is whether the general health perceptions are impacted by SNAP benefits.

Health

Perceived health status or health perception is the degree to which a person understands and believes, using their own measurement of how healthy they are. Not only is maintaining a good health status important for every household, health perception is essential in understanding

what it means to have a quality diet, fit for a healthy life. Having exceptional health enables social, economic and personal development fundamental to well-being (CDC, 2018). The goal of a healthy life is freedom from illness and injury, as well as a complete social well-being and not merely the absence of disease (National Academy of Sciences, 2013). Health perception can be affected by variables such as socio-economic, psychological illness, injuries, biological risks, and environment health status. Perceived health may be impacted by an individual's food security status, particularly by households who have low-income and feel as though they are unable to obtain a balanced diet.

Holben and Berger-Marshall (2017) summarized that food insecurity among adults is associated with poor physical and mental health status. Specific health conditions associated with food insecurity include inflammation, which is correlated with numerous chronic conditions, sleep disorders, kidney disease, human immunodeficiency virus infection, diabetes, and depression (in women) (Holben & Berger-Marshall, 2017). In a nationally representative sample, among working-age US adults living at or below 200% of federal poverty level, lower food insecurity is associated with high probability of 10 chronic diseases, including hypertension coronary heart disease, hepatitis, stroke, cancer, asthma, diabetes, arthritis, chronic obstructive pulmonary disease and kidney disease (Gregory & Coleman-Jenson, 2017). Other health-related behaviors, such as smoking, are also associated with food insecurity (Holben & Berger-Marshall, 2017).

Pheley, Holben, Graham, and Simpson (2002) studied the relationship between food security and self-reported health data in participants of 10 Appalachian Ohio counties. All levels of food insecurity, even the least severe, were similarly associated with poor perceived health

status (Pheley et al., 2002). The study suggests that households who exhibit even minimal food insecurity may still have negative health perceptions compared to their food secure counterparts.

In rural, Appalachian Ohio, Walker et al. (2007) found a negative association of food insecurity to perceived health status. Poor health status is closely related to malnutrition, which may stem from chronic food insecurity (Nelson, Cunningham, Andersen, Harrison & Gelberg, 2001). Easily attainable, inexpensive, and otherwise convenient food that is usually pre-cooked or bulk items, often contain low nutrition which could be the main cause for developing or poor management of chronic disease in food insecure households. Despite the advances in public health, poor health outcomes increase as socioeconomic position decreases. The inequalities that exist in health status in the United States are directly related to inequalities in economic status (Barker, Roblin, Self-Brown, Shaw & Theis, 2016).

In the study examining whether chronic disease disparities are associated with economic status and metropolitan classification, CDC researchers found that participants in nonmetropolitan counties were significantly more likely to report chronic diseases and risk factors than those in metropolitan counties (Barker, Roblin, Self-Brown, Shaw & Theis, 2016). The study also found that the food environment in poor counties also contributed to a higher prevalence of chronic diseases and poor health status (Barker, Roblin, Self-Brown, Shaw & Theis, 2016).

In a study outlining the association of food insecurity to poor health status, researchers documented that there is a strong correlation between food security status and chronic health conditions among working-age adults living at or below 200 percent of the Federal poverty line (FPL) (Gregory & Coleman-Jensen, 2017). The relationship of food security status and health outcomes is correlated among the food security classifications: high, marginal, low, and very low

(Gregory & Coleman-Jensen, 2017; USDA, 2020). Food that tends to be inexpensive, easily accessed, or convenient often contain less nutrients which can be the main cause for poor health perceptions or poor management of chronic disease in food insecure households. Most differences in health, are statistically significant, implying large potential differences in expected costs of illness across food security categorizations; the exact food-insecurity classification captures important information about economic hardship and how it translates into poorer health outcomes (Gregory & Coleman-Jensen, 2017).

Figure 4 and 5 summarize the prevalence of poor health by food security status in low-income households (Gregory & Coleman-Jensen, 2017).

Figure 4. *Predicted Prevalence of More Common Chronic Diseases by Food Security Status, Adults in low-income Households (2017)*

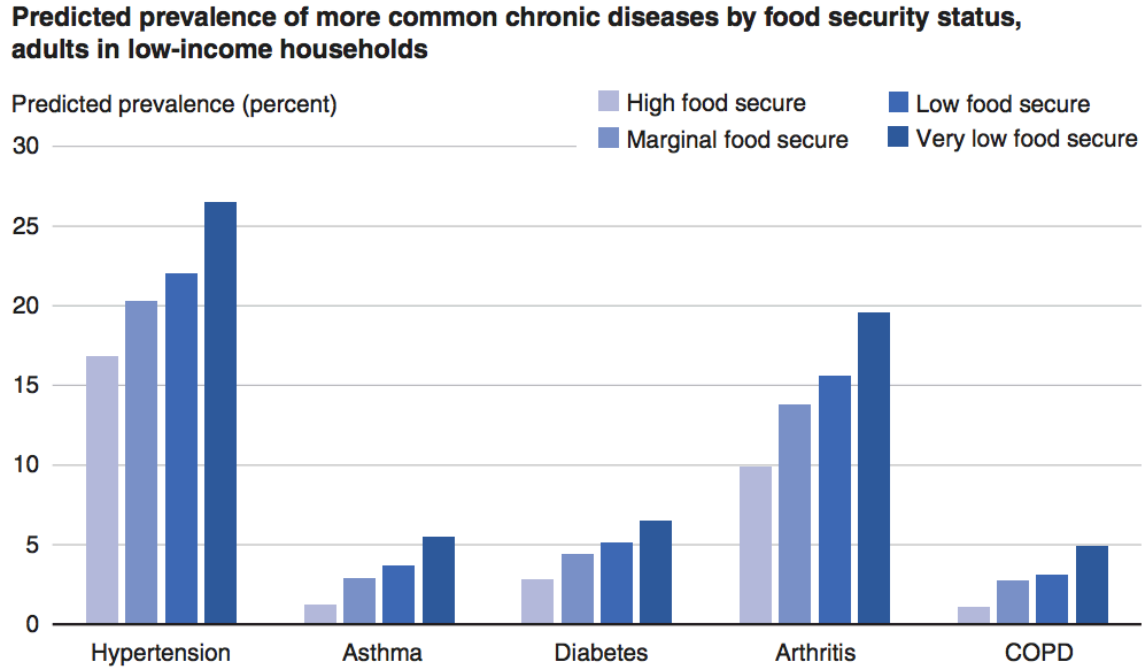
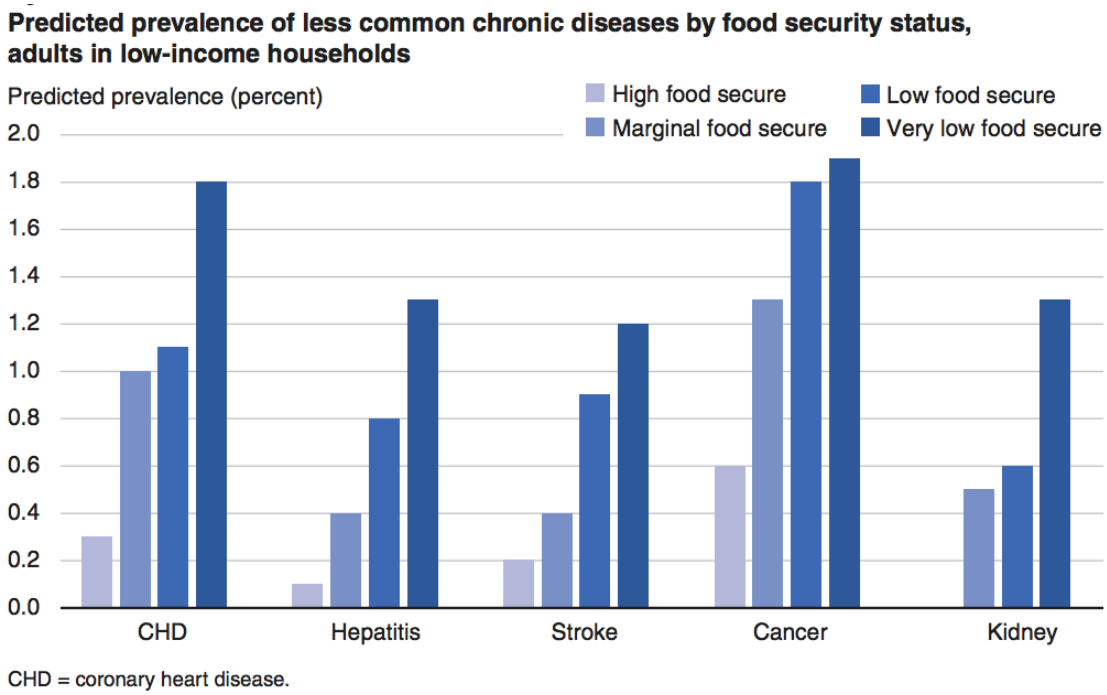


Figure 5. *Predicted Prevalence of More Common Chronic Diseases by Food Security Status, Adults in low-income Households (2017)*



Source: USDA, Economic Research Service calculations using National Health Interview Survey data. Predicted prevalence estimates are adjusted for: survey year indicators, age, gender, employment, marital status, race/ethnicity, insurance status, highest education of any adult in household, number of children, family size, and household income-to-poverty ratio. Sample includes working age adults in households at or below 200 percent of the Federal Poverty Line (Gregory, Coleman-Jensen, 2017).

In 2004, a study was conducted in the lower Mississippi Delta region that examined the association between household food insecurity and self-reported health status in adults. The study found that adults in food-insecure households were significantly more likely to rate their health as poor/fair and scored significantly lower on the physical and mental health scales (Casey et al., 2004).

As compared to other portions of the country, people in the Appalachian region have increased risk for chronic diseases, such as heart disease, obesity, and diabetes, while there is

also a strong correlation between food security status and chronic health conditions among adults living below the federal poverty line (Halverson & Harner, 2004; Gregory & Coleman-Jenson, 2017). In fact, in the state of Mississippi, seven of the leading causes of death are chronic disease-related, including heart disease, cancer, chronic obstructive pulmonary disease, stroke, Alzheimer's, diabetes, and kidney disease (Short, 2014).

Gregory, Smith, and Wendt (2011) assessed Americans' perspectives on their eating habits in order to determine if Americans are realistic about their eating habits and how they relate to health. It was concluded that individuals are increasingly aware of unhealthy eating habits but are not motivated to make significant changes (Gregory, Smith & Went, 2011). Americans appeared to be much less likely to rate their diet as "excellent" or "very good," but rather "average" or "poor" (Dominick, 2014). In other words, the more individuals eat at restaurants and drink soft drinks, the lower they rated the nutrition of their diet.

Diet Quality

Holben and Berger-Marshall (2017) summarized that food insecurity among adults is associated with inadequate intakes of vitamin A and B-6, in addition to inadequate intake of vegetables, fruits, and dairy. Poor nutrition outcomes were also documented in nationally-representative samples of food-insecure adults (Holben & Berger-Marshall, 2017). Among US adults, meal and snack behaviors differed, with food-insecure adults consuming fewer, but larger meals and more snacks (Holben & Berger-Marshall, 2017). A high diet quality can be described as one rich in essential vitamins, minerals, and trace elements through balanced and varied nutrition (USDA, 2020).

In 2017, adults in the United States were estimated to eat fruit 1.1 times a day and vegetables 1.6 times a day, while *Dietary Guidelines for Americans* suggest at least 2 cups of

fruit and 3.5 cups of vegetables daily (CDC, 2017; DHHS, 2015). According to a study comparing the relationship of social class and diet quality, a larger portion of epidemiologic data show that diet quality follows a socioeconomic gradient (Darmon & Drewnowski, 2008). Whole grains, leans meats, fish, low-fat dairy products, and fresh vegetables and fruit are more likely to be consumed by groups of higher socioeconomic status; whereas, the consumption of refined grains and added fats has been associated with lower socioeconomic status (Darmon & Drewnowski, 2008). Potential barriers, such as cultural background and cost, directly influence the consumption of a healthy diet quality (Casagrande et al., 2007). In fact, adults with diabetes in general report low dietary compliance, and those with low incomes may have more difficulty following a diabetic diet due to financial constraints (Nelson, Cunningham, Andersen, Harrison & Gelberg, 2001). Food insecurity has been related to poor quality diets, including lower consumption of fruits and vegetables and low intakes of essential nutrients (Nelson et al., 2001).

Poor diet quality among Americans is associated with 5 of 10 leading causes of death in America, including heart disease, certain types of cancer, stroke, diabetes, and atherosclerosis (Bidlack, 2013). The national guidelines regarding diet consumption exist for healthy children and adults and are outlined in the *Dietary Guidelines for Americans* (DHHS & USDA, 2005); however, research has indicated that the majority of Americans do not meet these recommendations (Basiotis, Carlson, Gerrior, Juan & Lino, 2002).

The *Dietary Guidelines for Americans* suggested that the recommended diet is: 1) high in a variety of fruits, vegetables, and whole grains; 2) low in saturated fat, cholesterol, and trans-fat and moderate in total fat; and 3) limited in sugar, salt, and alcoholic beverages (DHHS & USDA, 2017). To support *Dietary Guidelines for Americans,* the USDA recently updated *MyPlate* that

utilizes nutritional guidelines, and the appropriate number of servings and portion sizes for all food groups (USDA, 2021).

In a study examining how Americans rate their diet quality, researchers found that Americans have become much less likely to rate their diets as "Excellent" or "Very Good" in terms of healthfulness (Gregory, Smith & Wendt, 2011). They also found that diet perception is positively associated with household availability of dark green vegetables and low-fat milk and negative associated with availability of sweetened soft drinks (USDA, 2011). According to the ERS, conventional wisdom suggests that better diets cost more, and it is not a stretch to think that the opposite proposition-that spending more might secure a better diet-is also widely assumed by consumers (Gregory, Smith & Wendt, 2011). The ERS also confirms that there is a clear relationship between household financial resources and diet perception: people who rate their diets as "Excellent" tend to come from households with greater financial resources that those who rate their diet as "Poor" (Gregory, Smith & Wendt, 2011).

Child Health

U.S. households in rural areas with children under the age of six, are particularly more vulnerable to food insecurity than households without children as summarized by Walker et al, (2007). In a study examining the relationship between hunger and psychosocial functioning in low-income American children, researchers found that intermittent experiences of food insufficiency and hunger are associated with poor behavioral and academic functioning in low-income children (Murphy, Wehler, Pagano, Little, Kleinman & Jellinek, 1998). A similar study was conducted in 2006 that suggested an association between child level food insecurity and iron deficiency anemia, a clinically important health indicator with known negative cognitive, behavioral, and health consequences (Meyer, et al., 2006). Food insecurity has consequences for

children. Extensive research has demonstrated that food insecurity adversely affects children's growth, cognitive development, academic achievement, and physical and emotional health (Alaimo, Oslon, Frongillo & Briefel, 2001).

Although children are typically protected from very-low food security in the United States, food insecurity and subsequent nutritional inadequacy is associated with lower overall dietary quality in children, especially older children (Holben & Berger-Marshall, 2017). Gundersen and Kreider (2009) also reported that children living in food-insecure households had a greater risk for myriad health and related problems, including poor overall health, mental health and psychosocial issues, frequent stomach and headaches, more hospital admissions, and higher rates of iron deficiency, and they exhibited poorer developmental outcomes including readiness. Chronic health conditions and behaviors, including anemia and asthma; childhood aggression; anxiety and depression; hyperactivity; dental caries; fracture risk (among males); and reduced physical activity, have all been associated with food insecurity (Holben & Berger-Marshall, 2017).

According to a study on U.S. preschool and school aged children, food insecure children were more likely than poor but marginally food secure children, to suffer from health problems such as frequent colds, ear infections, anemia, asthma, and frequent headaches (Alaimo et al., 2001). Low-income children were significantly more likely than high-income children to have been reported as being in fair or poor health, always having stomachaches, having a restricted impairment, having been iron deficient (Alaimo et al., 2001). Poor access to food and low family income are health concerns for U.S. children (Alaimo et al., 2001; Holben, McClincy, Holcomb, Dean, & Walker, 2004). Not having enough food to eat or a nutrient dense diet produces additional health risks among both low-income and middle-income children. Food insecure

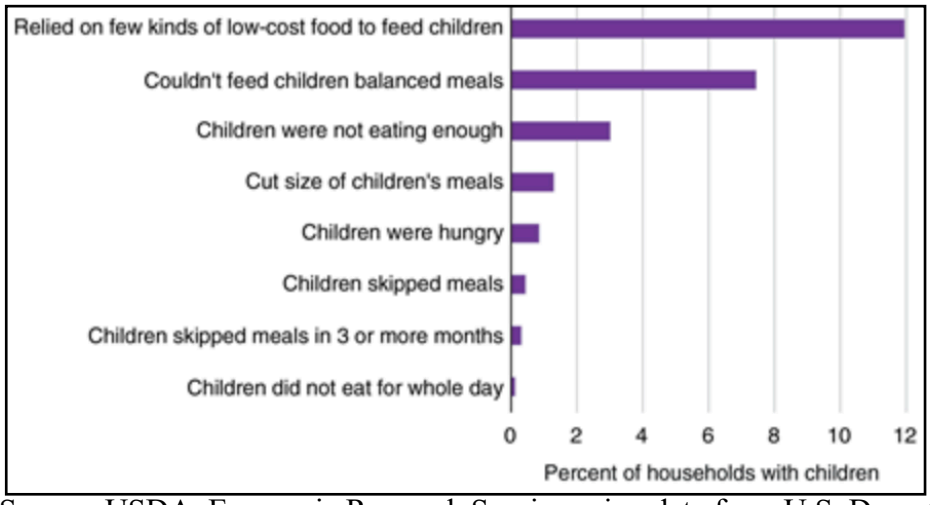
children are more likely than food secure children to live in low-income families and to be without health insurance and a regular source of health care. Above these social characteristics, households that do not have enough food to eat has a negative impact on a child's health.

Child Diet Quality

Out of all U.S. households with children, in 2017, 11.9 percent indicated they relied on a few kinds of low-cost food to feed children because they were running out of money for food and 1.3 percent affirmed that they cut the size of children's meals because there was not enough money for food (USDA, 2018). As summarized in Figure 6, 0.4 percent of U.S. households with children indicated that children had skipped meals and 0.1 percent reported that children had not eaten for a whole day at some time in the last year because there was not enough money for food.

Figure 6

Percent of Households with Children Affirming Food Insecurity Conditions is Lower for More Severe Conditions



Source: USDA, Economic Research Service using data from U.S. Department of Commerce, U.S. Census Bureau, 2018 Current Population Survey Food Security Supplement.

As summarized by Holben and Berger-Marshall (2017), food insecurity has been associated with decreased consumption of vegetables, particularly nutrient-rich, dark green vegetables, among U.S. children. Widome et al. (2009) examined diet quality and food insecurity among middle and high school youth. Compared with youth living in food-secure households, youth living in food-insecure households consumed a greater percentage of calories from fat, ate fewer family meals and breakfasts, had less availability at home, and perceived greater barriers to consuming a healthful diet (Widome, Neumark-Sztainer, Hannan, Haines, & Story, 2009).

Childhood obesity trends have risen due to poor diet quality causing many negative immediate and long-term health consequences (Lane, 2017). Childhood obesity also puts children and adolescents at higher risk for obesity later in life and diseases such as type 2 diabetes, atherosclerosis, and sleep apnea (Lane, 2017). In a study examining childhood obesity in food insecure households, researchers confirmed that poor nutritional intake in food insecure households can be associated with childhood obesity (Tester, Lang, & Laraia, 2015). Environmental factors such as abundant access to energy dense foods such as refined grains and added fats contributes to poor child diet. In contrast, a study examining if social factors influenced the relationship of food insecurity and childhood obesity, further explored the idea that parents and public institutions protect children from food insecurity by trimming down their consumption, or by institutional support, thus affecting their overall diet quality (Mata, Dallacker, & Hertwig, 2017).

The dietary recommendations for children in the US are met by incorporating more vegetables, fruits, and whole grains (Gidding, Dennison, Birch, et al., 2006). Including vegetables of a variety of colors such as dark leafy greens and legumes into the daily diet will help to reach a healthier diet. Whole fruits are also recommended for their contribution of fiber

and lower energy density (USDA, 2017). In recent years there is also a push for children and adolescents to limit their intake of saturated fats, added sugar, and sodium, which remain prevalent in counties with higher food insecurity (Gidding, Dennison, & Birch et al., 2006; USDA, 2017).

CHAPTER III. METHODS

This thesis examined if there were differences in perceived adult health score, perceived adult diet score, parent-perceived child health score, and parent-perceived child diet score by SNAP usage and household, adult food security in a rural, Appalachian Mississippi community.

Institutional Review Board Approval

The cross-sectional survey was approved by the University of Mississippi Institutional Review Board prior to data collection.

Setting and Participants

According to the U.S. Census Bureau (U.S. Census, Bureau, 2019), Calhoun County, Mississippi, is a "non-metro, completely rural county, or with less than 2,500 of its urban population not adjacent to a metro area," according to the Rural-Urban County Codes designation of the USDA's Economic Research Service (USDA, 2016). Calhoun County is designated as a distressed county for the 2017 fiscal year, by the Appalachian Regional Commission (ARC) (Appalachian Regional Commission, 2018).

Participants

In this study, prospective participants (n=1,084) were adults with elementary school aged children in a rural, Appalachian Mississippi school district in grades K4-grade six. Participants were those who returned completed surveys.

Study Procedures and Analysis

Perspective participants were provided a survey at the beginning of the study in a packet that was taken home by the elementary school children. The survey measured adult and child demographics, perceived diet quality score, health perception score, and household, adult food security status. Demographic questions, including age, gender, race, household adult food security [10-item Household Adult Food Security Survey Module (Bickel, Nord, Price, Hamilton, & Cook, 2000; USDA, 2020)], and perceived health and dietary questions.

Household food security status was scored following the USDA procedures (Bickel et al., 2000; USDA, 2020). The USDA 10-item Household Adult Food Security Survey Module was used to determine participants' food security status. Affirmative responses were totaled and categorized in accordance with USDA procedures to determine a food security scale score and category (Appendix A). Health and diet perception questions for both children and adults were patterned after the methods of Townsend and Kaiser (2005). Perceived-adult health, perceived-adult diet quality, parent-perceived child health, parent-perceived child diet quality all utilized a Likert scale, with "Excellent" being rated as 5 and "Poor" being rated as 1 (Appendix B). Health and diet scores corresponded to the Likert scale rating and ranged from 1 to 5.

Data Analysis

IBM Corp. SPSS version 24 (Armonk, NY) was used to tabulate and summarize all data. Food security (food secure versus food insecure; fully food secure versus not fully food secure) by SNAP usage (non-SNAP versus SNAP) groups stratified participants into one of four groups. Groups were: 1) food insecure non-SNAP (n=26), food insecure SNAP (n=22), food secure non-SNAP (n=95), and food secure SNAP (n=46); and 2) not fully food secure non-SNAP (n=45), not fully food secure SNAP (n=35), fully food secure non-SNAP (n=76), and fully food secure

SNAP (n=33). Differences were determined using a one-way analysis of variance (ANOVA) with Tukey (HSD) post-hoc test. An alpha level of .05 was selected *a priori* to determine statistical significance. The research questions and statistical procedures are summarized in Table 5.

Table 5

Research Questions and Statistical Procedures of the Study

Research Question	Statistical Procedures
Does the perceived health of adults differ by SNAP usage and food security?	One-way analysis of variance with the Tukey HSD post-hoc test
Does the perceived diet of adults differ by SNAP usage and food security?	One-way analysis of variance with the Tukey HSD post-hoc test
Does parent-perceived child health differ by SNAP usage and food security?	One-way analysis of variance with the Tukey HSD post-hoc test
Does parent-perceived child diet differ by SNAP usage and food security?	One-way analysis of variance with the Tukey HSD post-hoc test

CHAPTER IV. RESULTS

This thesis examined if there were differences in perceived adult health score, perceived adult diet score, parent-perceived child health score, and parent-perceived child diet score by SNAP usage and food security in a rural, Appalachian Mississippi community.

Participant Characteristics

Of those surveyed (n=1,084), the participants for this study consisted of 190 adults who returned complete surveys (17.5% response rate). These participants were 35 ± 9 years of age, with children 7 ± 2 years of age.

Participants were predominantly white (n= 127, 66.8%), female (n=178, 94.7%), non-SNAP users (n=121, 63.7%), and food secure (n=142, 74.7%). Table 6 summarizes the characteristics of the participants.

Table 6. *Characteristics of Rural, Appalachian Mississippi Adults with Elementary School Aged Children.*

Characteristic	**n**	**%**
Race (n=190)		
African American	49/190	25.8%
White	127/190	66.8%
Hispanic	14/190	7.3%
Gender (n=188)		

Male	10/190	5.3%
Female	178/190	94.7%
SNAP (n=190)		
Participant	69/190	36.3%
Non-Participant	121/190	63.7%
Household Adult Food Security Status (n=190)		
High Food Security[a,c]	109/190	57.4%
Marginal Food Security[a,d]	33/190	17.4%
Low Food Security[b,d]	24/190	12.6%
Very Low Food Security[b,d]	24/190	12.6%

[a]Food security

[b]Food insecurity

[c]Fully food secure (no indications of food insecurity)

[d]Not fully food secure

Perceived Health and Diet Quality

Table 7 summarizes the perceived adult health, parent-perceived child health, adult perceived diet quality, and parent-perceived child diet quality among participants. Participants scored relatively high between both health perception and diet quality in this region.

Table 7. *Health and Diet Perceptions of Rural, Appalachian Mississippi Adults with Elementary School Aged Children.*

Health/Diet Characteristic	**n**	**%**
Perceived Adult Health		
Poor	2/189	1.1%
Fair	30/189	15.9%
Good	59/189	31.2%
Very Good	73/189	38.6%
Excellent	25/189	13.2%
Parent-Perceived Child Health		
poor	1/190	0.5%
fair	30/189	2.1%
good	59/189	20.5%
very good	73/189	35.3%
excellent	25/189	41.6%
Perceived Diet Quality-Adult		
poor	4/190	2.1%
fair	48/190	25.3%
good	81/190	42.6%
very good	47/190	24.7%
excellent	10/190	5.3%
Parent-Perceived Diet Quality-Child		
poor	4/190	2.1%

fair	27/190	14.2%
good	74/190	38.9%
very good	51/190	26.8%
excellent	34/190	17.9%

Differences in Health and Diet Quality by Food Security and SNAP Participation

Table 8 summarizes the comparison of household adult food security status (food secure versus food insecure) and SNAP usage (participants and non-participants) with measures of health and diet quality (perceived adult health score, perceived child health score, perceived adult diet score, and perceived child diet score).

Table 8. *Food Security and SNAP Comparisons Among Rural, Appalachian Mississippi Adults with Elementary School Aged Children.*

Group	Perceived Adult Health Score	P value
Food Insecure Non-SNAP (n=26)	0.51	.004
Food Insecure SNAP (n=22)	0.55	
Food Secure Non-SNAP (n=95)	0.67	
Food Secure SNAP (n=46)	0.65	
Group	**Perceived Adult Diet Score**	**P value**
Food Insecure Non-SNAP (n=26)	0.45	.093
Food Insecure SNAP (n=22)	0.46	
Food Secure Non-SNAP (n=95)	0.52	
Food Secure SNAP (n=46)	0.57	
Group	**Perceived Child Health Score**	**P Value**

Food Insecure Non-SNAP (n=26)	0.78	.351
Food Insecure SNAP (n=22)	0.73	
Food Secure Non-SNAP (n=95)	0.81	
Food Secure SNAP (n=46)	0.85	

Group	**Perceived Child Diet Score**	**P value**
Food Insecure Non-SNAP (n=26)	0.63	.014
Food Insecure SNAP (n=22)	0.53	
Food Secure Non-SNAP (n=95)	0.59	
Food Secure SNAP (n=46)	0.74	

As shown in table 8, perceived adult health (p=.004) and parent-perceived child diet (p=.014) significantly differed between groups. The post hoc test revealed that food secure non-SNAP users had better perceived health than food insecure non-SNAP users (p=.008), and that food secure SNAP users had greater perceived child diet scores than food insecure SNAP users (p=.036).

Table 9 summarizes the comparison of household adult food security status (fully food secure versus not fully food secure) and SNAP usage (participants and non-participants) with measures of health and diet quality (perceived adult health score, parent-perceived child health score, perceived adult diet score, and parent-perceived child diet score).

Table 9. *Food Security and SNAP Comparisons Among Rural, Appalachian Mississippi Adults with Elementary School Aged Children.*

Group	Perceived Adult Health Score	P value
Not Fully Food Secure Non-SNAP (n=45)	0.55	.002
Not Fully Food Secure SNAP (n=35)	0.56	
Fully Food Secure Non-SNAP (n=76)	0.69	
Fully Food Secure SNAP (n=33)	0.67	

Group	Perceived Adult Diet Score	P value
Not Fully Food Secure Non-SNAP (n=45)	0.47	.129
Not Fully Food Secure SNAP (n=35)	0.50	
Fully Food Secure Non-SNAP (n=76)	0.53	
Fully Food Secure SNAP (n=33)	0.58	

Group	Perceived Child Health Score	P Value
Not Fully Food Secure Non-SNAP (n=45)	0.78	.874
Not Fully Food Secure	0.81	

SNAP (n=35)	
Fully Food Secure	0.82
Non-SNAP (n=76)	
Fully Food Secure	0.81
SNAP (n=33)	

Group	Perceived Child Diet Score	P value
Not Fully Food Secure	0.57	.160
Non-SNAP (n=45)		
Not Fully Food Secure	0.63	
SNAP (n=35)		
Fully Food Secure	0.61	
Non-SNAP (n=76)		
Fully Food Secure	0.73	
SNAP (n=33)		

As shown in table 9, perceived adult health (p=.002) significantly differed between groups. The post hoc test revealed that fully food secure non-SNAP users had a greater perceived health than not fully food secure SNAP users (p=.026) and not fully food secure non-SNAP users (p=.008); and that food secure SNAP users had greater perceived child diet scores than food insecure SNAP users (p=.026).

CHAPTER V. DISCUSSION AND CONCLUSIONS

This thesis examined if there were differences in perceived adult health score, perceived adult diet score, parent-perceived child health score, and parent-perceived child diet score by SNAP usage and food security in a rural, Appalachian Mississippi community. Overall, the study showed that perceived adult health and parent-perceived child diet scores are lower in food insecure SNAP users, compared to food secure non-SNAP users in a rural, Appalachian Mississippi community.

Household Adult Food Security

This study found that 25.2 percent of participants lived in households that were food insecure (12.6 percent low food security, 12.6 percent very low food security). While this sample may not representative of Calhoun county, these findings represent a higher prevalence of food insecurity compared to that of Mississippi (17.2 percent) and the United States (12.3 percent), per 2017 national estimates (Coleman-Jensen et al., 2018).

Households with children are particularly vulnerable to food insecurity (Coleman-Jenson, et al. 2020). As summarized in the 2017 estimates of food insecurity (Coleman-Jenson, 2018), 15.7 percent of households with children in the U.S. experienced food insecurity at some time in 2017, compared to only 10.5 percent of U.S. households. Since our sample was drawn from households with children, the rates of household food insecurity observed in this thesis study may be due the household composition.

In addition, considering the studies done in Appalachian Ohio, where increased rates of food insecurity were observed (Walker et al., 2007; Holben, Bletzacker & Holcomb, 2009; Kropf et al., 2007; Pheley et al., 2002; Holben, McClincy, Holcomb, Dean & Walker, 2004; Holben & Pheley, 2006), our findings may be related to regionality of our sample, as the county where this thesis study was conducted is in the Appalachian region.

The results of this thesis study are consistent with both Pheley, Holben, Graham, and Simpson (2002), in which participants in rural, Appalachian Ohio had greater rates of food insecurity, compared to national averages, and Dolstad, Woodward, Green, and McSpirit (2016), where participants in rural, Appalachian Kentucky were classified as food-insecure at greater rates than the national averages.

West Virginia is located entirely in Appalachia with 14.9 percent (102,561 households according to the United States Census Bureau) of its households considered as food insecure, according the 2017 estimates (Coleman-Jensen et al., 2018). Since 12/55 counties are considered to be distressed by the ARC in 2017 (ARC, 2018), it is not surprising that West Virginia households experience food insecurity at rates greater than the national average. Coupled with the aforementioned observed rates, it appears that the Appalachian region may be prone to food insecurity, compared to other regions of the United States.

Perceived Adult Health

This study found that perceived adult health scores were lower in food insecure SNAP users, compared to food secure non-SNAP in a rural, Appalachian Mississippi community. Poor health status is closely related to malnutrition which may stem from chronic food insecurity (Nelson et al., 2001). Considering that this thesis study examined households with children, there is potential that parents or caregivers are willing to compromise their own health status in order

to ensure their children remain in good health status. In a study examining whether low-income, single mothers compromise their own health to feed their children, McIntyre et al.(2003) confirmed that single mothers from low-income households have been shown to compromise their own diets to feed their children, pre-serving the adequacy of their children's diets (McIntyre et al., 2003).

The results of this thesis study are similar to those found by Pheley, Holben, Graham, and Simpson (2002), who found in a sample from Appalachian Ohio that all levels of food insecurity, even the least severe, were similarly associated with poor perceived health status. Walker et al. (2007), further supports the negative correlation between food insecurity and poor perceived health status in their study that found that there is a negative association of food insecurity to perceived health status. Similarly, in a nationally representative sample among working-age US adults living at or below 200 percent of federal poverty level, lower food insecurity is associated with high probability of 10 chronic diseases, including hypertension coronary heart disease, hepatitis, stroke, cancer, asthma, diabetes, arthritis, chronic obstructive pulmonary disease and kidney disease (Gregory & Coleman-Jenson, 2017).

Previous research has shown that easily attainable, inexpensive, and otherwise convenient food that is usually pre-cooked or bulk items, often contain low nutrition which could be the main cause for poor health management in food insecure households. As previously noted, in 2004, a study was conducted in the lower Mississippi Delta region that examined the association between household food insecurity and self-reported health status in adults. The study found that adults in food-insecure households were significantly more likely to rate their health as poor/fair and scored significantly lower on the physical and mental health scales (Casey et al., 2004). Compared to the Mississippi Delta, people in the Appalachian region have increased risk for

chronic diseases, such as heart disease, obesity, and diabetes, and there is also a strong correlation between food security status and chronic health conditions among adults living below the federal poverty line (Halverson & Harner, 2004).

Using SNAP participation as a means of evaluating economic status in this thesis study, the data support the research done by Barker et al. (2016) examining that the inequalities that exist in health status in the United States are directly related to the inequalities in economic status.

Perceived Adult Diet Quality

No significant differences were found in the adult diet quality scores (p=.093) among the four-food security, SNAP usage groups in a rural, Appalachian Mississippi community were found (Table 3). This could potentially be influenced by the SNAP program participation as it increases food resources, thus improving the perceived diet quality of its participants. A high diet quality can be described as one rich in essential vitamins, minerals, and trace elements through balanced and varied nutrition. In 2017, adults in the United States were estimated to eat fruit 1.1 times a day and vegetables 1.6 times a day, while *Dietary Guidelines for Americans* suggest at least 2 cups of fruit and 3.5 cups of vegetables daily (CDC, 2017; DHHS, 2015).

Potential barriers such as cultural background and cost directly influence the consumption of a healthy diet quality (Casagrande et al., 2007), and may have also contributed to the findings of this thesis. Since no significant differences were found in the adult diet quality scores, these results may infer that SNAP could be beneficial to improving adult diet perception.

For example, in a study examining the effects of SNAP participation on food-insecure households, Gregory, Ploeg, Andrews and Coleman-Jensen (2013) found that there are aspects of diet quality on which SNAP participants do better; in particular, they consume less sodium and

saturated fat than their non-SNAP participating counterparts. Additionally, they found that SNAP participants will change from eating no whole fruit to eating more (Gregory, Ploeg, Andrews & Coleman-Jensen, 2013).

In contrast, Hudak, Racine & Shulkind (2021) found that an increase in SNAP benefits did not significantly impact food security or diet quality in low-income children and adolescents. This effect could be the result of both time constraints associated with SNAP work requirements and extra income; people on SNAP may see whole fruit as more affordable with a little extra income, and consume more of it because it requires no preparation time (Gregory, Ploeg, Andrews & Coleman-Jensen, 2013).

Parent-Perceived Child Health

The results of this thesis study did not find significant differences in parent-perceived child health scores (p=.874) between food secure and insecure, SNAP users and non-SNAP users in a rural, Appalachian Mississippi community. These findings may be due to parents or caregivers having a greater sense of child health perception under SNAP participation, as it protects their children from malnutrition. Children are typically protected from very-low food security in the United States; however, food insecurity and subsequent nutritional inadequacy, can be associated with lower overall dietary quality in children, especially older children as summarized by Holben & Berger-Marshall (2017). Parent-perception of child health among participants in this thesis study may have contributed to the findings, considering that data were not collected directly from children, regarding their own health perceptions.

Previous research suggests that children living in food-insecure households had a greater risk of health problems (Berger-Marshall & Holben, 2017). While we did not measure prevalence of specific conditioning, a study based on food insufficiency and US preschool and

school aged children, food insecure children were more likely than poor but marginally food secure children, to suffer from health problems such as frequent colds, ear infections, anemia, asthma, and frequent headaches (Alaimo et al., 2001). Not having enough food to eat or a nutrient dense diet produces additional health risks among both low-income and middle-income children. Given that there were no significant differences in parent-perceived child health between SNAP users and non-users, this may be due to SNAP participation allowing households to provide more food resources to their children, improving their perception of their child's diet.

Parent-Perceived Child Diet

This thesis study found that parent-perceived child diet scores were lower in food insecure SNAP users, compared to food secure non-SNAP users in a rural, Appalachian Mississippi community. These results are consistent with Widome and colleagues' (2009) findings that diet quality and food insecurity among middle and high school youth consist of a greater percentage of calories from fat among food insecure homes. These results may be likely due to having a better diet, and consequently, a better perception of their children's diet, while participating in SNAP. Their study also found that compared with youth living in food-secure households, youth living in food-insecure households ate fewer family meals and breakfasts, had less availability at home, and perceived greater barriers to consuming a healthful diet (Widome, Neumark-Sztainer, Hannan, Haines, & Story, 2009). While it was not measured in this study, families who participate in SNAP are also eligible for free school breakfast and lunch (USDA, 2018). As such, parents may perceive their children's diet to adequate, knowing that school meals are being provided.

Previous research in food insecure children, has showed that children in food insecure homes are more likely to suffer from a wide array of negative health outcomes associated with a

poor diet, than food secure children (Gunderson & Kreider, 2009). In a study based on Food Security, SNAP usage, and produce behaviors among elementary school children in a rural, Appalachian community, Sandha and Holben (2019) found that children living in food insecure households have worse produce behaviors and diets, compared to their food secure counterparts.

Considering our data was conducted in 2017, the overall diet quality of US children from 4-18 years old in 2017, was reported to be poor and at the national level youth ages from 4-18 years old are ultimately not following the USDA guidelines (Banfield, Liu, Davis, Chang, & Frazier-Wood, 2018).

Out of all U.S. households with children, according to 2018 data, 11.9 percent indicated they relied on a few kinds of low-cost food to feed children because they were running out of money for food and 1.3 percent affirmed that they cut the size of children's meals because there was not enough money for food (USDA, 2018); which may have contributed to our findings.

Limitations

Several limitations existed that could have impacted the study. First, only 17.5 percent (190 adults) of perspective participants returned completed surveys. The percentage of participants who returned completed surveys may not be representative of the entire community from which it was drawn. The study associated with this thesis utilized a convenience sample. In an effort to improve this limitation in future studies, an incentive could be provided to participants to improve the number of completed surveys. To improve generalizability of the results to the Appalachian region of Mississippi, this study could be implemented at other elementary schools in the region.

Another potential limitation of the study associated with this thesis was the parent-perceived child health and the parent-perceived child diet quality scores, as the child perceptions

may have differed from their parents. Though children may not understand the varying degrees of health perception, their own health and diet perceptions may affect their potential health status. An important caveat to consider is that there may be cultural or other factors which may impact a parent's perception of their child's health. For example, in a study analyzing the parental perceptions of child activity levels and overall health, Hispanic parents rated their child's overall health less favorably than non-Hispanic parents despite the trend toward healthier weight and overall report of healthier dietary and physical activity behaviors (Vangeepuram et al., 2016). It is likely that parents from different cultural backgrounds are judging their children's health by different standards or whether these children are in fact less healthy (Vangeepuram et al., 2016). This could be a potential avenue for further research.

Implications for Future Research

Exploring interventions collaboratively with households having children in rural, Appalachian Mississippi to improve food security is warranted. Implementing education that includes nutrition management strategies and proper health and diet perceptions is recommended for future research. After reviewing research in other areas of the Appalachian region, it is evident that there is a trend of food-insecurity and further research could be done to confirm this relationship.

The results pertaining to this thesis focus on families with children who participate in SNAP versus those who do not. To further this research, it would be interesting to examine which other groups may need assistance outside of families with children, like single adults or aging seniors. SNAP education may also directly influence our results considering there were few differences among diet and health perceptions among SNAP participants, potentially

increasing overall health perceptions. Whether or not SNAP users participate in SNAP education is another avenue this thesis could further research in the future.

Lastly, both food insecurity and poor diet and health perceptions could be explored in other rural parts of Appalachian Mississippi. The research among food-insecure households in Appalachia is growing increasingly and has been shown especially common in other parts of the Appalachian region (Walker et al., 2007; Holben, Bletzacker & Holcomb, 2009; Kropf et al., 2007; Pheley et al., 2002; Holben, McClincy, Holcomb, Dean & Walker, 2004; Holben & Pheley, 2006). To further research food-insecurity and its associations with poor diet and health perceptions in other areas of Appalachia would be beneficial to better understand deficiencies in the region.

APPENDIX A

Household, Adult Food Security Survey Module (10-item) Scoring Procedures

Survey Items and Script

[IF SINGLE ADULT IN HOUSEHOLD, USE "I," "MY," AND “YOU” IN PARENTHETICALS; OTHERWISE, USE "WE," "OUR," AND "YOUR HOUSEHOLD."]

These next questions are about the food eaten in your household in the last 12 months and whether you were able to afford the food you need.

In the past 12 months, I/we worried whether my/our food would run out before I/we got money to buy more.			
Often true	Sometimes true	Never true	Don’t know or Prefer Not to Answer

In the past 12 months, the food that I/we bought just didn’t last, and I/we didn’t have money to get more. (circle one)			
Often true	Sometimes true	Never true	Don’t know or Prefer Not to Answer

In the past 12 months, I/we couldn’t afford to eat balanced meals. (circle one)			
Often true	Sometimes true	Never true	Don’t know or Prefer Not to Answer

In the past 12 months, did you/ you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food? (circle on box only)			
Yes, it happened 3 or more days.	Yes, it happened 2 days or less.	No	Don't know or Prefer Not to Answer

In the past 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food? (circle one box only)		
Yes	No	Don't know or Prefer Not to Answer

In the past 12 months, were you ever hungry but didn't eat because you couldn't afford enough food? (check one box only)		
Yes	No	Don't know or Prefer Not to Answer

In the past 12 months, did you lose weight because you didn't have enough money for food? (check on box only)		
Yes	No	Don't know or Prefer Not to Answer
In the past 12 months, did you/ you or other adults in your household ever not eat for a whole day because there wasn't enough money for food? (circle one box only)		
Yes, it happened 3 or more days.	Yes, it happened 2 days or less.	No	Don't know or Prefer Not to Answer

Coding Responses and Assessing Households' Food Security Status:

Responses of "often" or "sometimes" on questions HH3 and HH4, and "yes" on AD1, AD2, and AD3 are coded as affirmative (yes). Responses of "almost every month" and "some months but not every month" on AD1a are coded as affirmative (yes). The sum of affirmative responses to the six questions in the module is the household's raw score on the scale.

Food security status is assigned as follows:

- Raw score 0-1—High or marginal food security (raw score 1 may be considered marginal food security, but a large proportion of households that would be measured as having marginal food security using the household or adult scale will have raw score zero on the six-item scale)
- Raw score 2-4—Low food security
- Raw score 5-6—Very low food security

For some reporting purposes, the food security status of households with raw score 0-1 is described as food secure and the two categories "low food security" and "very low food security" in combination are referred to as food insecure.

For statistical procedures that require an interval-level measure, the following scale scores, based on the Likert measurement model may be used:

Number of affirmatives	Scale score
0	NA
1	2.86
2	4.19
3	5.27
4	6.30
5	7.54
6 (evaluated at 5.5)	8.48

However, no interval-level score is defined for households that affirm no items. (They are food secure, but the extent to which their food security differs from households that affirm one item is not known.)

Response Options

For interviewer-administered surveys, DK ("don't know") and "Refused" are blind responses—that is, they are not presented as response options but marked if volunteered. For self-administered surveys, "don't know" is presented as a response option.

Screening

If it is important to minimize respondent burden, respondents may be screened after question AD1. Households that have responded "never" to HH3 and HH4 and "no" to AD1 may skip over the remaining questions and be assigned raw score zero. In pilot surveys intended to validate the module in a new cultural, linguistic, or survey context, however, screening should be avoided if possible and all questions should be administered to all respondents.

30-Day Reference Period

The questionnaire items may be modified to a 30-day reference period by changing the "last 12-month" references to "last 30 days." In this case, item AD1a must be changed to read as follows:

AD1a. [IF YES ABOVE, ASK] In the last 30 days, how many days did this happen?

_____ days

[ ] DK

Responses of 3 days or more are coded as "affirmative" responses.

APPENDIX B

Health and Diet Survey Items and Scoring Procedures

In general, my health is excellent, very good, good, fair, or poor?				
Poor	Fair	Good	Very good	Excellent

How would you best describe your diet? (circle one box only)				
Poor	Fair	Good	Very good	Excellent

In general, my child's health is excellent, very good, good, fair, or poor. (circle one box only)				
Poor	Fair	Good	Very good	Excellent

How would you best describe your child's diet? (circle one box only)				
Poor	Fair	Good	Very good	Excellent

Health and diet perception questions for both children and adults were patterned after the methods of Townsend and Kaiser (2005). Perceived-adult health, perceived-adult diet quality, parent-perceived child health, parent-perceived child diet quality all utilized a Likert scale, with

"Excellent" being rated as 5 and "Poor" being rated as 1 (Appendix B). Health and diet scores corresponded to the Likert scale rating and ranged from 1 to 5.

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