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Impact of Food Insecurity on the Management of Illness in Wayne County, Ohio

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Walden University
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Abstract

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Dissertation Submitted in Partial Fulfillment

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Abstract

The incidence of food insecurity coupled with poor management of illnesses poses a public health challenge. Poor adherence to medication regimens is a contributor to poor health outcomes, especially among the socioeconomically disadvantaged. Food insecurity is a global health and nutrition problem that affects approximately 50 million people in the United States. The number of food-insecure households in the United States has increased by 12% since 1995, and so has the burden of management of illnesses. The cost of healthcare has risen from 5% of the Gross Domestic Product (GDP) in 1960 to 20% of the GDP currently. This quantitative study used responses from questionnaires from a sample size of 130 to assess the impact that food insecurity has on the management of illnesses in families in Wayne County, Ohio. The social-ecological model was used as a theoretical framework to understand the various levels of influence of food insecurity on the management of illnesses. Results showed that people who were food insecure were 4 times more likely to skip medication (OR = 4.174; p = 0.0096), and people who used food assistance programs were more likely to skip medication (OR = 4.305; p = .0088; OR = .351; p = .0288). These results suggest that food insecurity is associated with the management of illness. To promote social change, solutions at the individual, healthcare, community, and policy levels are necessary to improve management of illness and prevent health complications. Providing communities with sustainable methods to empower them to supplement food and support consumption of balanced meals.

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Dedication

This dissertation is dedicated to my late parents, Orna Merle Penelope Burnett and Edwin Elijah Burnett, my children, Sely-Ann, Colwyn, Pedanderson, and Pierre, and my grandson Daniel Elijah Headley.

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Thank God for guidance and strength throughout this process. Thanks to my late parents Orna and Edwin Burnett for the foundation they laid in my upbringing and education and for training me to always strive for excellence. A special thank you to my husband Dr. Pierce Paul for his support and tolerance along this dissertation journey, and to my children for their support. Thank you to my siblings Florence, Edwin, and Monica for their prayers and encouragement. A special thank you to my friend, prayer partner, and cheerleader Barbara. My sincere appreciation to my dissertation Chairperson, Dr. Frazier Beatty, for his devotion, tolerance, and patience in providing guidance and encouragement throughout this process. My sincere gratitude and appreciation to my committee members Dr. Ji Shen and Dr. Raymond Panas for their patience and guidance and for sharing their knowledge, time and support. A special thank you to Dr. Michael Tefs (Walden Alumnus) and the CEO of A Whole Community, Inc. for their support and encouragement. Special thank you to the directors of various food pantries and all other organizations that played a role in my completion of this dissertation. Thanks to my friends and colleagues who provided support and encouragement.

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Chapter 1: Introduction

Food insecurity is a public health issue and is associated with adverse health outcomes. Murthy (2016) described food insecurity as an underrecognized determinant of health that imposes significant encumbrances on society. Food insecurity is a "cyclic phenomenon with repeated episodes of food scarcity following episodes of relative food adequacy" (Seligman, Jacobs, Lopez, Tschann, & Fernandez, 2012, p. 4). Food insecurity is a global health and nutrition problem that affects approximately 50 million people in the United States (Gundersen & Ziliak, 2015).

For Wayne County, Ohio, as of 2018, the median income was $53,600.00, which is an increase from $52,700.00 in 2016 (Robert Wood Johnson Foundation [RWJF], 2018). Approximately 11.9% of people in Wayne County, Ohio are living in poverty (U.S. Census Bureau, 2018). Wayne County has a 13% food insecurity rate, compared to 17% for the state (RWJF, 2018). This rate is slightly lower than 14% in 2015 (RWJF, 2016). However, 5% of the county's population has limited access to healthy food, compared to 7% for the state (RWJF, 2018).

While several studies have demonstrated the association between medication underuse and health outcomes, only one study has examined the role food insecurity plays in medication underuse in a nationally represented sample in the US (Herman, Afulani, Coleman-Jensen & Harrison, 2015). Research focusing on the impact of food insecurity on children and older adults has been done, but there has been very little research on non-senior adults (Gundersen & Ziliak, 2015). Further review of the literature

also revealed one study that was conducted in 2006 and looked at the use of food pantries and food security in 82 counties in Ohio including Wayne County (O'Connell, Holben, & Holcomb, 2008).

In this quantitative study, I used primary data from a questionnaire that was administered to 130 Wayne County, Ohio families who experience food insecurity, live in single, coupled, or extended households headed by adults between the ages of 18 and 65 years old. The family units were classified as insured or uninsured, receiving or not receiving Supplemental Nutrition Assistance Program (SNAP) or Women Infants and Children (WIC) benefits, and using or not using food pantries, food banks, and soup kitchen resources. The questionnaire that was used is a modified version of the Georgia (GA) Advanced POMP6 study (GA Advanced POMP6). This questionnaire met all the requirements of a sample restricted to a certain age group with specified characteristics and a multi-item measure of food insecurity and adherence to medication. Using data from this questionnaire allowed for the examination of the relationships between food insecurity and medication use/underuse, as well as the use of federal and nonfederal food assistance programs and medication use or underuse.

The purpose of this chapter is to provide a comprehensive but concise overview of the study. In the first section, I provide a background that includes empirical evidence for the foundation of this study. In the second section, I described the problem of food insecurity and stated the purpose of the study. The third section states the research questions and hypotheses and the sociodemographics of Wayne County, Ohio. The fourth

section details the theoretical framework social-ecological model (SEM), developed in 1979 by Urie Bronfenbrenner. Subsequent sections detail the nature of the study, definitions of key terms, scope, assumptions, delimitations, and limitations of the study, food insecurity prevalence, trends, and population demographics in the United States, and history and measurement of food insecurity in the United States. The chapter concludes with a summary.

Background

Nutrition is necessary for human growth and development and disease treatment and prevention (Ohlhorst et al., 2013; Slawson, Fitzgerald & Morgan, 2013; Szucs & Stoffel, 2016). Furthermore, achieving adequate nutrition is dependent on food supply and proper diet, which are also key to effectively reducing the burden of many diseases (Ohlhorst et al., 2013; Slawson et al., 2013). According to Robaina and Martin (2013), access to food is necessary to human life, but a lack of food affects millions of households in the US.

While many households have adequate food, millions of households experience food insecurity, with the number of food-insecure households fluctuating between 2010 and 2016. In 2010, food insecurity affected 14.5% of people living in the US, while in 2011 14.9% of American households experienced food insecurity (Coleman-Jensen, Nord, Andrews & Carlson, 2011; Coleman-Jensen, Rabbitt, Gregory & Singh, 2012). In 2012, food insecurity affected 14.7% of US households, while in 2013, 14.3% of households were affected (Coleman-Jensen, Nord & Singh, 2013; Coleman-Jensen,

Gregory & Singh, 2014). In 2014, 14% of American households experienced food insecurity, while in 2015, 12.7% of families experienced food insecurity (Coleman-Jensen, Rabbitt, Gregory & Singh, 2015; 2016). In 2016, there were 15.6 million food insecure households who were unable to provide enough food for their families because of a lack of resources (Coleman-Jensen et al., 2017).

National trends in food insecurity between 1995 and 2016 are presented in Figure 1, and a comparison between the prevalence of food insecurity averages from 2011 to 2013 and 2014 to 2016 is presented in Figure 2. Prevalence rates for 1996 and 1997 in Figure 1 were adjusted for the estimated effects of differences in data collection screening protocols used in those years.

The information in Figure 1 came from the U.S. Department of Agriculture (USDA) Economic Research Service (ERS), using data from the Current Population Survey Food Security Supplement. The information in Figure 2 was calculated by the USDA ERS based on Current Population Survey Food Security Supplement data and USDA ERS data from the December 2014, 2015, and 2016 Current Population Survey Food Security Supplements. In Figure 2, the different levels of food insecurity are depicted by different colors representing food insecurity levels below, above or near the U.S. average. Ohio is one of eight states that has a food insecurity level above the national average (USDA ERS, 2018).

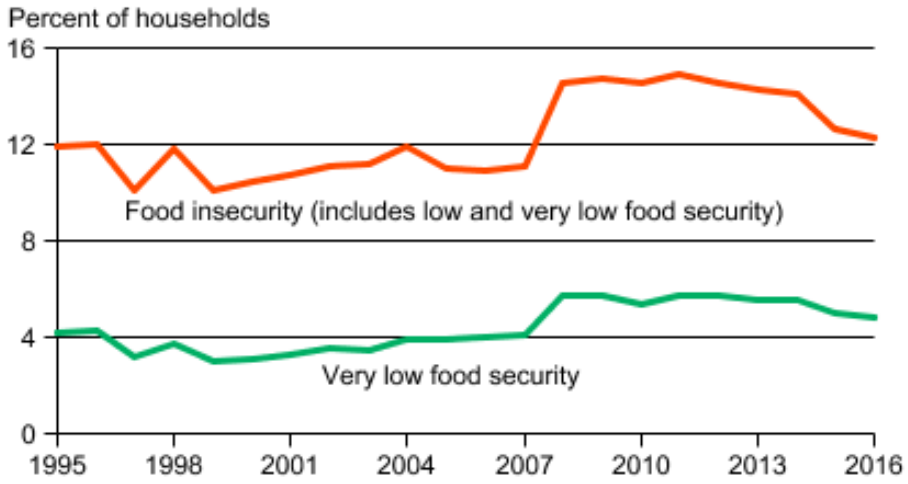

Figure 1. Trends in prevalence rates of food insecurity and very low food security in U.S. households between 1995 and 2017. Adapted from ERS, US Department of Agriculture - Key Statistics & Graphics. (2018). Retrieved on March 11, 2018, from https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/key-statistics-

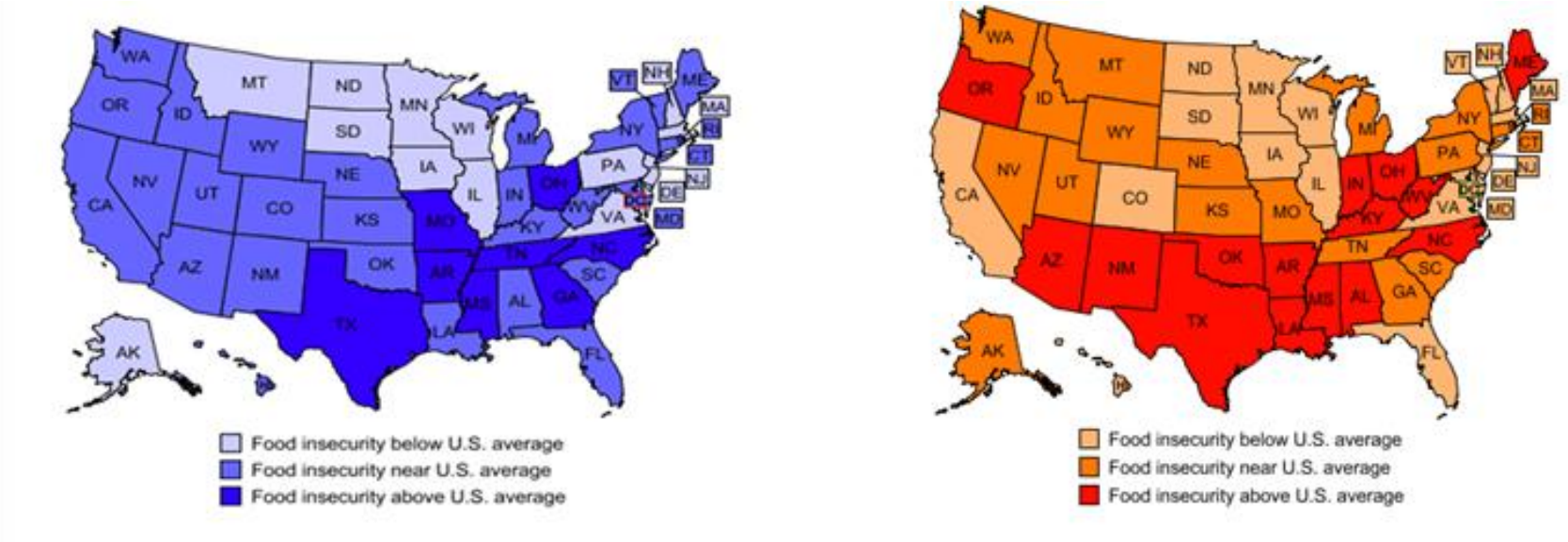

Figure 2. Comparison of the prevalence of food insecurity average from 2011 to 2013 and 2014 to 2016. Adapted from ERS. (2018). Food security status of households in 2017. Retrieved on March 11, 2018, from https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/key-statistics-graphics.aspx

Food insecurity can have an adverse impact on people's health, wellbeing, dietary intake, individual medical decisions, and medical care (Cook et al., 2013). Issues such as diabetes, blood sugar control, metabolic conditions, chronic diseases, mental illness, and distress also have been linked to food insecurity (Food Research and Action Center [FRAC], 2014a, b; Herman et al., 2015). Furthermore, people who experience food insecurity are three times more likely to suffer from mood or anxiety disorders (Tarasuk, Mitchell, McLean, & McIntire, 2013). Poor health and depression in adults, and poor health, cognitive, and emotional development of children are all associated with food insecurity (Kaiser, 2011).

Food insecurity is defined by the USDA as the "limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire food in socially acceptable ways" (as cited by Schroeder & Smaldone, 2015, p. 3-4). The USDA has classified food insecurity into the categories of low and very low food security. Low food security was formally food insecurity without hunger and refers to "reports of reduced quality, variety, or desirability of diet, with little or no indication of reduced food intake" (ERS, 2017). Very low food security was formally called food insecurity with hunger and refers to "reports of multiple indications of disrupted eating patterns and reduced food intake" (ERS, 2017). Food insecurity is also referred to as hunger, food insufficiency, and food hardship (Franklin et al., 2012).

Food insecurity is evidenced by recurring episodes of food shortage after periods of having adequate food (Seligman et al., 2012). Food insecurity affects millions of

vulnerable populations in the U.S, with a documented 14% or approximately 17.4 million food insecure households in 2014 (Coleman-Jensen et al., 2015). The RWJF (2016) reported that in Wayne County, Ohio, the food insecurity rate is 13%, while 4% of the county's population has limited access to food, the median income is $53,600.00, and approximately 20% of children are living in poverty. This study is necessary to provide current information on food insecurity in Wayne County, Ohio. Furthermore, the results from this study will provide pertinent information that could help various professionals working to support and promote social change in various communities of Wayne County, Ohio.

Problem Statement

Food insecurity coupled with poor management of illnesses poses a public health challenge. There is a strong association between food security and medicine underuse (Siegel, Miller & Jemal, 2015; Sorkin & Billimek, 2012). Medication underuse is a contributor to poor health outcomes, especially among the socioeconomically disadvantaged (Musumari et al., 2014; Siegel et al., 2015; Sorkin & Billimek, 2012). Food insecurity is particularly important because many illnesses are diet and medication sensitive and could result in complications if people have to choose between food and medication (Heindel & Vandenberg, 2015; Holben & Marshall, 2017). Seabury et al. (2014) alluded to six key research areas related to medication adherence, which include the need to identify factors that impact medication adherence.

There were gaps related to studies capturing the impact of food insecurity and management of illness among low-income residents in Ohio and Wayne County, Ohio since no research was found on this issue for Ohio. While there has been research focusing on the impact of food insecurity on children and older adults, there has been very little research on non-senior adults (Gundersen & Ziliak, 2015). Herman et al. (2015) highlighted that while several studies demonstrated the association between medication underuse and health outcomes, only one study examined the role food insecurity plays in medication underuse in a nationally represented sample in the US. Review of the literature also revealed one study by O'Connell et al. (2008) that was conducted in 2006 and looked at the use of food pantries and food security in 82 counties in Ohio including Wayne County. Sattler (2013) highlighted the need for more research to improve the understanding of needs, cost, and prescription medication usage patterns in older adults. Vogenthaler et al. (2013) alluded to the need for intervention models that target food insecurity interventions in the HIV community.

Purpose of the Study

The purpose of this quantitative study was to assess the impact that food insecurity has on the management of illnesses in families and determine whether there is an association between food insecurity and poor illness management. This study was based on the premise that food insecurity results in limited ability to manage various illnesses. The results from this study will provide insight into the relationship between food insecurity and management of illnesses and promote and encourage social change at

the institutional, community, and individual levels. Results from this study could positively impact social change by signaling the need for inclusion of food insecure households during the development, implementation, and evaluation of policies that help to strengthen current structures aimed at improving food insecurity and management of illnesses. Findings from this study could also prompt the development of innovative and sustainable interventions and strategies that target food insecure households also living with various illnesses.

Research Questions and Hypotheses

RQ1: Is there an association between food insecurity and the management of illnesses in Wayne County, Ohio?

$H_0$1: There is no statistically significant association between food insecurity and the management of illnesses in Wayne County, Ohio.

H_a1: There is a statistically significant association between food insecurity and the management of illnesses in Wayne County, Ohio.

RQ2: Is there an association between the use of food assistance programs and medication adherence in terms of the management of illnesses in Wayne County, Ohio?

$H_0$2: There is no statistically significant association between use of food assistance programs and medication adherence in terms of the management of illnesses in Wayne County, Ohio.

H_a2: There is a statistically significant association between use of food assistance programs and medication adherence in terms of the management of illnesses in Wayne County, Ohio.

Sociodemographic of Wayne County, Ohio

Wayne County was established on January 4, 1812, under an Act of Legislature of the State of Ohio. Originally, Wayne County was called Killbuck but was renamed after General Anthony Wayne of the Revolutionary War (Wayne County Health Department, 2016). Wayne County is located in Northeast Ohio and is the 13th largest county in Ohio. Wayne County's four largest cities are Orville, Smithville, Rittman, and Norton. The US Census Bureau (2018) estimated the population of Wayne County in 2017 at approximately 116,038, distributed among rural and urban communities. Black non-Hispanics account for 1.6% of the county's population, while the Hispanic population in is 2.0%, the White non-Hispanic population is 95.4%, and the Asians population in the county is 1.0% (US Census Bureau, 2018). According to the US Census Bureau (2018), 1.7% of Wayne County's residents are of two or more races. Wayne County's population is made up of 24.4% of people below 18 years old and 17.4% of people 65 years and older (US Census Bureau, 2018).

The median income for Wayne County in 2017 was $53,600.00 (RWJF, 2018), While the U.S. Census Bureau (2018) reported that approximately 11.9% of Wayne County residents are living in poverty. Wayne County has a 13% food insecurity rate, compared to 16% for the state (RWJF, 2018). This rate is slightly lower than 14%

reported for 2015 (RWJF, 2016). The national average for food insecurity was 12.3% in 2016 (Coleman-Jensen et al., 2017). Furthermore, 5% of the county's population has limited access to healthy food, compared to 7% for the state (RWJF, 2018). Wayne County's income inequality rate is 3.9, which is higher than the national average of 3.7, but lower than the state's rate of 4.8 (RWJF, 2018). The income equality rate is based on the Gini coefficient which measures income inequality (Gastwirth, 2016). Approximately 11.9% of Wayne County's residents are living in poverty (US Census Bureau, 2018). Table 1 provides a summary of the overall demographic profile of Wayne County, Ohio.

Table 1

Summary of Demographics, Health Behaviors, and Social and Economic Factors for Wayne County, Ohio in 2016-2017

Demographics	Statistics
Population	116,038
Income Inequality rate	3.9
Demographics	%
Non-Hispanic Black	1.6
Non-Hispanic White	95.4
Asian	1
Hispanic	2
Two or more races	1.7
Females	50.3
Below 18 years	24.4
65 years and older	17.4

Table continues.

Health Behaviors	
Food Insecurity	13
Limited access to healthy food	4
Social and Economic Factors	
Median Household Income	$53,600.00
People Living in Poverty	11.9

Theoretical Framework: SEM

This study used the SEM as a theoretical framework to understand the various levels of influence on food insecurity and management of illnesses. The SEM places emphasis on the various levels of influence that influence health behaviors (Richard, Gauvin, & Rame, 2011). Using the SEM allows for closer scrutiny of the influencing factors of behavior shaping (McLeroy, Bibeau, Steckler, & Glanz, 1988).

The Ecological Systems Theory also referred to as the SEM was developed in 1979 by Urie Bronfenbrenner (Bronfenbrenner, 1979; Raingruber, 2014). In defining the ecology of human development, Bronfenbrenner (1979) emphasized the effect the environment has on a person's life. The ecological perspective places emphasis on how several factors interact across the various levels of a health problem (National Cancer Institute [NCI], 2005). The SEM focuses on the reciprocal influence of the environment on people and vice versa (Raingruber, 2014). The SEM also focuses on how the intercultural, community, organizational, and interpersonal levels significantly influence behavior (Raingruber, 2014). The SEM fosters the integration of the various aspects of a

person's life that occur at various levels (Caswell & Yaktine, n.d.). The aforementioned characteristics would make the SEM beneficial to this study since the results are expected to show how an environment of food insecurity influences how Wayne County residents manage their illnesses. I expect the results of this study to be similar to those seen in the correctional studies in which medication underuse was prevalent in those who were experiencing food insecurity (Berkowitz et al., 2014; Sorkin & Billimek, 2012). The SEM suggests that there are five levels of influence on health-related behavior and conditions: these five levels are individual, interpersonal, organizational, community, and public policy factors (NCI, 2005).

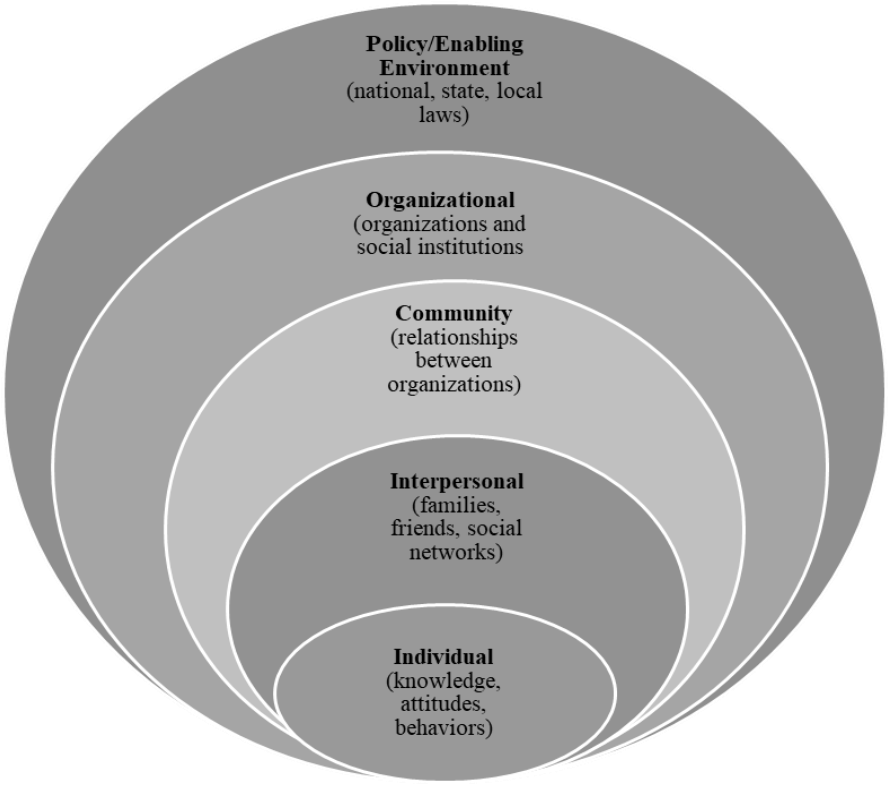

Figure 3. The five levels of influence for health-related behavior and conditions. Source: Adopted from: Glanz, K. (n.d.). E-source. Behavioral and Social Science Research, p. 14. Retrieved from http://www.esourceresearch.org/Default.aspx?TabId=736

The SEM refers to individual characteristics that influence behavior, such as knowledge, attitudes, beliefs, and personality traits. The interpersonal concept refers to interpersonal processes and primary groups, including family, friends, and peers who provide social identity, support, and role definition.. At the community level, the institutional factors refer to rules, regulations, policies, and informal structures which may constrain or promote recommended behaviors. Community factors refer to social networks and norms or standards, which exist formally or informally among individuals, groups, and organizations. Public policy refers to local, state, and federal policies and laws that regulate or support healthy actions and practices for disease prevention, early detection, control, and management. The proposed theoretical model in Figure 4 illustrates links between demographics, food insecurity, and potential consequences.

Nature of the Study

This dissertation is a cross-sectional quantitative study using a survey to gather self-reported responses to answer research questions. The survey used to assess food insecurity and medication adherence is a modified version of the survey used in the GA Advanced POMP6 study. The GA Advanced POMP6 Study was conducted between July and November 2008 with new participants in the Older Americans Act Nutrition Program (OAANP). The dependent variable is adequacy of medication use for their specific illnesses, and the independent variable is food insecurity. Adequacy is measured using the appropriate medication usage based on the amount and how often. Covariates are categorized as demographic (age, gender, ethnicity/race), clinical (diabetes, hypertension,

kidney disease, HIV/AIDS, depression, cancer), and socioeconomic (participation in SNAP and WIC). The target population for this study is randomly selected families experiencing food insecurity and reside in the main cities in Wayne County, Ohio. These families include single, coupled, or extended households headed by adults or an adult between the ages of 18 and 65 who do and do not receive SNAP and WIC benefits.

Some basic descriptive statistical analyses were conducted to describe the typical characteristics of the sample. Further analyses were used to determine significant associations between food insecurity and the covariates and dependent variables. Statistical significance was found and further analyses were conducted. Logistic regression analyses were conducted to assess the association between food insecurity and management of illnesses. The level of significance for this study was $p < .05$, the statistical power of this study was 62%, and the alpha level was $\alpha = .05$. Outlined in Chapter 3 is a detailed data analysis plan.

Definition of Terms

In this section, I provide technical and conceptual definitions for key terms used in the dissertation:

Diabetes Mellitus: A metabolic disorder that results in abnormal glucose metabolism due to insufficient insulin production by the body, provoking high levels of blood sugar (glucose) (Nix, 2017; Venus & Taber, 2017).

Food insecurity: The restricted or uncertain availability of safe and nutritionally adequate foods or the restricted or uncertain acquisition food in socially acceptable ways. (Nix, 2017, p. 6).

Hunger: "The uneasy or painful sensation caused by a lack of food; the recurrent and involuntary lack of food" (Wunderlich & Norwood, 2006, p. 47) .

Hypertension (high blood pressure): When the force of the blood pushing against the blood vessel walls is consistently too high and blood pressure at three separate readings is higher than 140mm Hg/90 mm Hg diastolic (American Heart Association (AHA), 2018; Venus & Taber, 2017).

Overweight and Obesity: Excess fat accumulation that could affect a person's health (World Health Organization [WHO], 2018)

Scope, Assumptions, and Delimitations

I included participants who were residents of Wayne County but excluded participants under the age of 18 and over the age of 65. I assumed that most of the study population came from diverse socioeconomic backgrounds and that participants were honest in their responses. Another assumption was that participants who reported living in food insecure households would have also experienced food insecurity. Another assumption was that the questionnaire captured the true effect of food insecurity on the management of illnesses. These assumptions were necessary to provide validity to the study.

This study focused on the impact that food insecurity has on the way people manage their illnesses, specifically looking at whether people cut, skimp, or miss doses of their medication when faced with food insecurity. Delimitations of the study were that participants were both male and female, experienced food insecurity, belonged to single,

coupled, or extended households headed by adults, and were adults between the ages of 18 and 65. The families were either insured or uninsured, received or did not receive SNAP or WIC benefits, and used food assistance programs such as food pantries or soup kitchens. Data came from answers to the administered questionnaire and were limited to self-reported data, which allowed for testing the association between study variables.

Significance

There are many contributions that this study could make to the existing public health research on food insecurity and the way it impacts the management of illness. Researchers studying food insecurity have focused on this phenomenon in children and older adults, but not much in non-senior adults (Gundersen & Ziliak, 2015). Results from this study could increase awareness of food insecurity and management of illnesses practices within Wayne County, Ohio. Increased awareness of these issues could promote culturally fitting health interventions for people who experience food insecurity. Furthermore, results could also increase awareness of issues that may have policy implications, which could, in turn, promote a reduction in healthcare costs, and the maximization of food assistance programs all with the aim of improving the quality of life of Wayne County residents.

Food Insecurity Prevalence, Trends, and Population Demographics in the United States

Food insecurity embodies the physical feeling of hunger and those behavioral practices used to avoid hunger, which in turn can have serious health implications for

outcomes and the development of chronic disease in children and adults (Cook et al., 2013; Seligman, & Schillinger, 2010). Food insecurity is linked to financial instability associated with difficulty paying bills or making indispensable purchases (Hernandez, 2015). Food insecurity has a disproportionate effect on various population groups. Various subgroups are more likely to experience high levels of food insecurity. These groups include women and men who live alone, and households headed by either Black or Hispanic Americans with incomes near or below the federal poverty line and children (Coleman-Jensen et al., 2016).

Food insecurity can promote poor nutrition and dependence on energy-dense foods which in turn can cause rapid weight gain (Gundersen & Ziliak, 2015; Laraia, 2013). Seligman and Schillinger (2010) depict the relationship between food insecurity and health in their cycle of food insecurity and chronic disease. Based on the cycle of food insecurity and chronic disease, food insecurity can lead to constrained dietary options which cause people to adopt compensatory strategies to either avoid food waste or skip meals in the absence of food (Seligman & Schillinger, 2010). These compensatory practices in conjunction with food insecurity lead to hyperglycemia, hypoglycemia, weight gain, weight loss, and stress which provoke three chronic diseases: obesity, hypertension and diabetes (Seligman & Schillinger, 2010). Furthermore, compounded with food insecurity and the development of chronic diseases is the inability to manage and take care of one's self and health, leading to stress, poor control of risk

factors, and increased healthcare expenditures (Seligman & Schillinger, 2010; Siegel et al., 2015).

Reducing food insecurity is a national priority as evidenced by the U.S. Department of Health and Human Services (DHHS) Healthy People 2020 goals. Healthy People 2020 goals for food insecurity include reducing household food insecurity and hunger in addition to eliminating very low food insecurity among children (DHHS, 2018). Even with these goals, food insecurity has been high nationally, in the state of Ohio, and in Wayne County, Ohio.

History and Measurement of Food Insecurity in the United States

History of Food Insecurity Measurement

Initial steps to addressing hunger and food insecurity began during the Great Depression in 1933 when the Federal Surplus Relief Corporation was established as part of the Agriculture Adjustment Act (AAA; Greene, 2018). During the Great Depression, basic farm commodities were purchased and distributed to various hunger relief agencies (Greene, 2018). In 1939, the Food Stamp Program (FSP) was created to assist low-income families after the country came out of the Great Depression and benefited approximately 20 million families over a 4-year period (Caswell & Yaktine, 2013; Food and Nutrition Service [FNS], 2018). The FSP ended after food surpluses, and unemployment became nonexistent (FNS, 2018). Between 1961 and 1964, after many studies and proposals, a pilot FSP was launched, and the Food Stamp Act passed in August of 1964 (Caswell & Yaktine, n.d.; (FNS, 2018). The focus of The Food Stamp

Act was to improve nutrition in low-income households and also impose Congressional control of the FSP and make the regulations a law (FNS, 2018). The National School Lunch Program (NSLP) and the Special Milk Program (SMP) were also established to help reduce food insecurity. In 1946, the National School Lunch Act passed, and in 1956 the Special Milk Program was commissioned (FNS, 2018).

The FSP expanded rapidly in the early 1970s and underwent major legislative changes (Caswell & Yaktine, n.d.; FNS, 2018). The changes included P.L. 91-671 (amendment to the 1964 Food Stamp Act) established on January 11, 1971 and P.L. 93-86 (Agriculture and Consumer Protection Act of 1973) established on August 10, 1973. P.L. 93-347 was established on July 12, 1974 and P.L. 93-86 was implemented on July 1, 1974 (Caswell, & Yaktine, n.d.; FNS, 2018; Wunderlich & Norwood, 2006). Under P.L. 91-671 of 1971, eligibility and work requirement standards were more uniform, and only 30% of family income could be allotted to household purchases. Furthermore, based on the establishment of an outreach requirement the FSP expanded to Guam, Puerto Rico, and the Virgin Islands (Wunderlich & Norwood, 2006). P.L. 93-86 of 1973 required nationwide expansion of the FSP and expanded to drug addicts and alcoholics enrolled in treatment and rehabilitation centers (Wunderlich & Norwood, 2006). The revision and reform of the Food Stamp Act in 1977 helped to establish uniform national eligibility standards, expand the FSP to minority communities, provide more federal support for state-level implementation, and restrict benefits to university students (Caswell & Yaktine, n.d.; Wunderlich & Norwood, 2006)

From 1980 to the present, the FSP went through several changes. The nutrition education component - SNAP - Education better known as SNAP-Ed of the FSP was established in 1981, with seven states implementing SNAP-Ed in 1992, and all fifty states implementing it by 2004 (Greene, 2018). Due to concerns related to size and cost of the FSP, participating households were required to meet certain criteria and more administrative control given to states by way of the 1996 Welfare Reform Act (Caswell & Yaktine, n.d.; Greene, 2018). The 1988 Hunger Prevention Act and the Mickey Leland Memorial Domestic Hunger Relief Act of 1990 added improvements to the FSP including the establishment of Electronic Benefit Transfer (EBT) cards, an alternative to the food stamp (Greene, 2018; Wunderlich & Norwood, 2006). EBT cards were modeled on credit and debit cards and were supposed to reduce fraud and fully replace food stamps in the early 2000s (Greene, 2018). In 2008, the FSP was renamed Supplemental Nutrition Assistance Program (SNAP) and it is currently the largest federal food assistance program in the United States (Greene, 2018).

In the late 1960s, defining hunger became a public matter which was emphasized in 1967 with a visit to the Mississippi Delta by the Joint Senate Subcommittee on Employment, Manpower, and Poverty led by Joseph Clark (D-PA) and Robert Kennedy (D-N.Y.) (Wunderlich & Norwood, 2006). Furthermore, defining hunger was also emphasized with the airing of "Hunger in America" documentary in 1968 (Wunderlich & Norwood, 2006). According to Wunderlich and Norwood (2006), many entities conducted studies attempting to define and measure hunger in America. However, since

there was no consensus on the definition of hunger, they varied, and the measurements were indirect and dissimilar (Wunderlich & Norwood, 2006). For example, the terms hunger and malnutrition were used interchangeably, and Because of competing political and professional agendas, hunger was measured using medical and dietary intake data, poverty trends involving the number of people seeking food assistance, and surveys (Wunderlich & Norwood, 2006).

In response to concerns regarding the increase of hunger in the late 1980s, President Ronald Reagan established a Task Force on Food Assistance to examine the hunger situation and create a working definition of hunger (Wunderlich & Norwood, 2006). The Task Force on Food Assistance concluded the inexistence of an unofficial hunger count, and FRAC developed the Community Childhood Hunger Identification Project (CCHIP) in response to inexistence of an unofficial hunger count, and to assess child hunger (Ihab, Rohana & Manan, 2015; Maroto, 2013; Wunderlich & Norwood, 2006). In 1990, Congress passed the National Nutrition Monitoring and Related Research Act (NNMRRA) which required the preparation and implementation of a 10-year comprehensive dietary and nutritional status assessment plan of the U.S. population (Wunderlich & Norwood, 2006). This plan was to be drafted by the Secretaries of the Department of Agriculture and DHHS in consultation with a Board (Wunderlich & Norwood, 2006). Specifications in the plan (Task V-C-2.4) also required standardized instruments necessary for defining and data collection of food insecurity, in addition to

suggested procedures that could be used with the NNMRR program statewide and locally (Wunderlich & Norwood, 2006).

Summary

The purpose of this chapter was to introduce and elaborate upon food insecurity and its impact on the management of illnesses in Wayne County, Ohio. This chapter discussed the problem statement, research design, research question and hypotheses, sociodemographic of Wayne County, Ohio, and the conceptual framework. Food insecurity is a public health issue that imposes significant encumbrances on society (Murthy, 2016). Understanding the influence that food insecurity has on the management of illnesses is crucial to preventing health problems associated with various diseases. Reducing food insecurity could promote positive social change by potentially improving the way people manage their illnesses, which could, in turn, reduce healthcare costs. Chapter 2 discusses the relevant literature and conceptual model that guides this study.

Chapter 2: Literature Review

This chapter reviews the literature on the SEM, food insecurity, chronic diseases, and the impact of food insecurity on medication adherence. The literature review includes the SEM that emphasizes the intricate relationship between and management of illnesses and individual factors at the societal level. These societal level factors include protective and risk factors related to people's management of their illnesses and health outcomes. This literature review explores the potential role of level of education, age, gender, and health insurance on the management of illness in Wayne County Ohio. .

The literature review has four sections. The first section details the literature search strategy, while the second section discusses the proposed theoretical framework, food insecurity, the SEM, and medication nonadherence. The third section thoroughly examines healthcare costs and the association between food insecurity, medication nonadherence, and chronic diseases; this section includes a review of the relevant literature, highlighting findings and current themes. The fourth section summarizes findings from the literature and describes the importance of these findings.

Literature Search Strategy

The literature search for this study was concentrated on peer-reviewed journal articles in the subject areas of healthcare, epidemiology, sociology, pharmacology, chronic diseases, and nutrition. Initially, the search was limited to articles published between 2013 and 2017. There were very few studies published on this topic during that time frame, and the search was extended to include studies published between 2009 and

2017. The literature review was conducted using PubMed Central, ProQuest, Google Scholar, SAGE, Science Direct, Nursing and Allied Health Sources, the WHO, ERIC, Medline, various textbooks, dissertations and theses, presentations, and notes from scientific meetings. I also enrolled to receive weekly peer-reviewed articles on food insecurity from Google Scholar.

The literature review process proved to be lengthy but enlightening. Searching for relevant content and articles involved using individual and combination terms relevant to the study. I used various combinations of terms such as: *social ecological model, food insecurity, chronic diseases, medication adherence, poverty, low-income status, socioeconomic status, nutrition, diabetes mellitus, hypertension, obesity and overweight, HIV/AIDS, medication underuse, SNAP, food insecurity in young adults, healthcare costs, and health disparities.*

Conceptual Framework

SEM and Management of Illnesses

The relationship between food insecurity and the management of illnesses can be explored using the theoretical model illustrating the link between demographics, food insecurity, and potential consequences. The SEM provides an accurate depiction that there is a mutual determinism between personal factors, the environment, and behavior. The SEM visually illustrates the active relationships people have with their environments (Golden, McLeroy, Green, Earp & Lieberman, 2015. Using an ecological perspective allows the integration of environmental and individual factors in the examination of

health outcomes (McElfish et al., 2016). A person's adherence to prescribed medication is influenced by individual characteristics and system-level factors (Berben, Dobbels, Engberg, Hill & De Geest, 2012). The SEM originates from coordination of systems linked to human development where organizations, people, societal norms, institutions, and available resources influence individuals (Golden et al., 2015).

This study was guided by the SEM which is a theory-based framework that is used to understand the different personal and environmental factors that influence behaviors. The proposed conceptual framework for food insecurity and the management of illness in Figure 4 depicts food insecurity and the factors that are likely to influence various outcomes and show possible interconnections between outcomes. This hypothetical model proposed that food insecurity is usually at the household level and is influenced by socioeconomic and demographic factors. These factors in turn provoke nutritional, clinical, and behavioral implications that influence health outcomes. Nutritional implications refer to the consumption of food that is nutritionally inadequate in both quality and quantity, thereby provoking clinical implications. Clinical implications refer to different illnesses that are provoked or affected by nutritional consequences. The clinical complications would in turn likely force individuals to adopt certain behaviors to cope with food insecurity and manage their illnesses. For example, a family experiencing hardship due to loss of work, illness, debt, or death could experience a reduction or complete loss of income, food insecurity, or the need to acquire additional income. This situation would likely force family members to adopt behavioral patterns

and coping strategies such as missing or reducing meals and medication doses. These actions could prove detrimental to health outcomes.

Weiser et al. (2015) used a similar framework to illustrate the association between food insecurity and health. Weiser et al. (2015) gave the example of various situations occurring at the household level; putting individuals at risk for food insecurity and forcing them to dispose of personal belongs in an effort to garner additional income. Furthermore being forced to adopt various survival tactics, increasing their risk for disease and perpetuating the recurring cycle of food insecurity and fragile health.

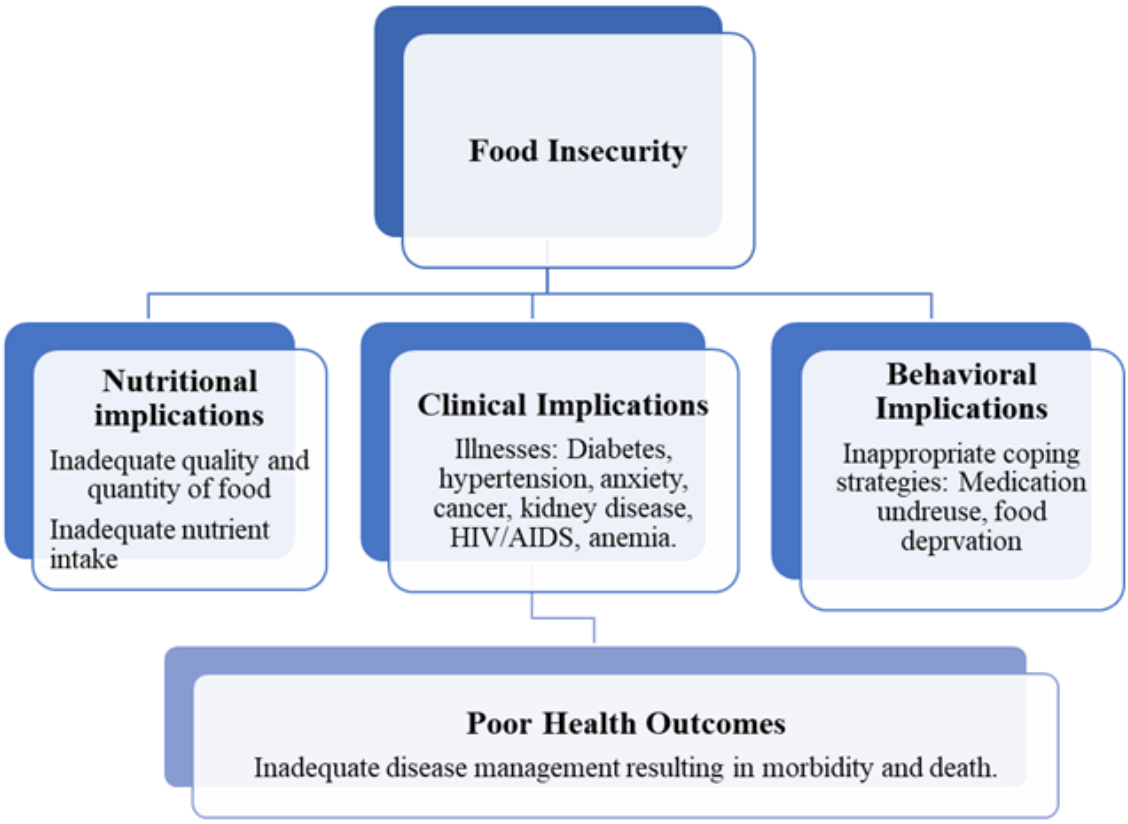

Figure 4: Proposed Conceptual Model for Food Insecurity and Management of Illness

Food Insecurity and Health

The importance of adequate dietary intake to optimal health is a well-established fact, and that people who are food insecure will reduce food intake which could provoke malnutrition. Schroeder and Smaldone (2015) said that people who are food insecure consume less nutritious diets in comparison to those who are food secure. Proper nutrition is among the most effective methods of nourishing the body to promote growth and development and reducing the risk for disease and associated risk factors (Koletzko, Brands, Poston, Godfrey & Demmelmair, 2012; Ohlhorst et al. 2013). Conversely, proper nutrition is dependent on the availability of food (Ohlhorst et al., 2013; Tarasuk et al., 2013). Currently, hunger and food-related diseases associated with poor or excess nutrient intake and undernourishment are affecting approximately 30% of people in the world (Tacon & Metian, 2013). Food insecurity has become a troubling phenomenon in the United States, with poverty status being the strongest predictor and low-income increasing vulnerability (Bruening, MacLehose, Loth, Story & Neumark-Sztainer, 2012; McIntyre, Bartoo & Emery, 2012; Wright, Kaushal, Waldfogel & Garfinkel, 2014). Based on the stated facts, the negative impact that food insecurity has on the management of illnesses is evident.

Approximately half the US population has one or more chronic conditions which require adherence to medical treatment for successful treatment (Ward, Schiller & Goodman, 2014). Adhering to medication regimens is fundamental to optimum health outcomes, preventing many diseases, and achieving clinical goals (Lam & Fresco, 2015;

MacDonell, Naar-King, Huszti & Belzer, 2013; Stirratt et al., 2015). The WHO (2003) stated that "increasing the effectiveness of adherence interventions may have a far greater impact on the health of that population than any improvement in specific medical treatment" (Lam & Fresco, 2015, p. 1). Medication nonadherence affects various disease processes. Non-adherence to medication is a serious and costly problem and could be influenced by cost among other factors (Jónsdóttir et al., 2012; Rolnick, Pawloski, Hedblom, Asche & Bruzek, 2013). Research shows the link between people experiencing food insecurity and the adjustment of behaviors which could be detrimental to their health (Herman et al., 2015). Furthermore, nonadherence to medication regimes can likely place patients at risk for negative outcomes and result in higher healthcare costs (Herman et al., 2015; Marcum, Sevick & Handler, 2013; Rolnick et al., 2013).

Food insecurity is associated with mental health issues such as postnatal depression, suicide and hazardous drinking (Dewing, Tomlinson, le Roux, Chopra & Tsai, 2013; Leung, Epel, Willett, Rimm & Laraia, 2014; Pryor et al., 2016). Data from the 2005–2010 NHANES (n=3518) showed that for adults with household incomes 130% below the federal poverty threshold, depression was evident in 9.3% of participants (Leung et al., 2014). Furthermore, for participants of the federally funded SNAP, depression was reported at 12.8%, while for SNAP nonrecipients depression was 6.7% (Leung et al., 2014). Dewing et al., (2013) assessed South African post-natal women (n = 249) for food insecurity, suicidal tendencies, and postnatal depression, and concluded

there was a strong association between depression, hazardous drinking, and the propensity to commit suicide.

Healthcare Costs

Healthcare costs are rising and continue to rise, making it a serious problem and cause for concern. The increasing cost of prescription drugs is burdening the US economy and patients who rely on medication (Dusetzina, Conti, Yu & Bach, 2017). Healthcare expenditure regarding the gross domestic product (GDP) was 5.0% in 1960, 7.9% in 1975, in 2016 17.8%, and is currently estimated at 20% (Brot-Goldberg, Chandra, Handel & Kolstad, 2017; McCarthy, 2015; National Center for Health Statistics (NCHS), 2017). The Centers for Medicare and Medicaid Services [CMS] 2018 reports that healthcare spending is projected to reach $5.7 trillion by 2026. Research has shown that the use of prescription drugs is expected to increase (Kantor, Rehm, Haas, Chan & Giovannucci, 2016). The rising healthcare costs pose a serious problem to policymakers, employers, and insurers (Brot-Goldberg et al., 2017; Trogdon et al., 2015). Poor health, disability, and mortality are responsible for the most healthcare expenditure because they are the products of chronic diseases (Bauer, Briss, Goodman & Bowman, 2014; Buttorff, Ruder & Bauman, 2017).

Chronic diseases rely on medication among other things for successful management. Annual healthcare expenditure for chronic diseases is 86% for people with a minimum of one chronic disease and 71% for multiple chronic diseases (Chapel, Ritchey, Zhang & Wang, 2017). As of 2014, six in 10 adults were living with at least one

chronic disease (Buttorff et al., 2017). In 2010 cancer care cost $157 billion and between 2012 and 2013 the cost of cardiovascular diseases averaged $316.1 billion (Benjamin et al., 2017). Approximately $126.4 billion of the cardiovascular cost between 2012 and 2013 represented direct medical costs and $126.4 billion represented loss of productivity costs due to premature deaths (Benjamin et al., 2017). In 2012, the estimated cost of diagnosed diabetes averaged $245 billion, with $176 billion and 69 billion representing direct medical cost and decreased productivity respectively (Benjamin et al., 2017). Obesity medical costs have been increasing over the years. The estimated obesity care expenditure increased from $147 billion in 2008 to $342.2 billion in 2013, which is a 28.3% (Biener, Cawley & Meyerhoefer, 2017; Benjamin et al., 2017)

Food Insecurity, SEM, and Medication Nonadherence

Food insecurity and factors present in their environment influence a patient's adherence to medication (Berben et al., 2012). Evidence of the impact of hunger on non-adherence to medication is demonstrated by results from a prospective observational study of (n = 59) men and women which showed that missing daily doses of medication were impacted by hunger (Pellowski et al., 2016). Food insecurity a fundamental problem and a contributing factor to non-adherence to medication and is more likely to affect certain groups of people than others. Patients reduce their chances of receiving the benefits of medication when they do not adhere to treatment.

Approximately one-half of the US population do not use their medication as prescribed by their doctors. Paraidathathu, Azuana, Islahudin, and Ahmad (2013) point

out that for people with chronic diseases, adherence to medication is a severe problem. Results from a study conducted by Berkowitz et al. (2014), showed food insecurity as a contributing factor to medication nonadherence was more likely to be reported by Hispanics and non-Hispanic Blacks. Furthermore, results from a study by Herman et al. (2015) showed that females, widows, divorcees, single parents with children, people without insurance coverage, people without functional limitations, and people diagnosed with a chronic condition were among those who demonstrated a higher prevalence of poor adherence to medication.

Food insecurity is associated with depression, low medication adherence and diabetes distress (Siegel et al., 2015; Silverman et al., 2015). Greater health expenditure, higher risk of death, recurring hospitalization, and higher healthcare costs are among the factors associated with non-compliance to medication (August, & Billimek, 2015; Fallis, Dhalla, Klemensberg & Bell, 2013; Levine et al., 2013). Non-adherence to medication has led to the annual evitable loss of approximately $1 billion (Marcum et al., 2013). Many authors have cited various factors that could influence nonadherence to medication. Factors that influence nonadherence to medication include cost, perceptions of the benefits of the medication, side effects, and food insecurity (Achappa et al. 2015; Berben et al., 2012; Kalichman et al., 2014; Paraidathathu et al. 2013; Young, Wheeler, McCoy & Weiser, 2013). Results from a study conducted by Herman et al. (2015) showed that cost-related medication underuse was more likely in non-elderly adults between the ages of 18 years and 64 years. Furthermore, results also showed a dose-response link between

poor medication adherence and food insecurity with 30% of 67 539 participants skipping medication to save money (Herman et al., 2015).

Food Insecurity, Medicine Non-adherence, and Chronic Diseases

Poor nutrition is associated as a risk factor for cancer, stroke, cardiovascular disease, and diabetes which are four of the top 10 causes of death in the US (Berkowitz, Hulberg, Standish, Reznor & Atlas, 2017; Schroeder & Smaldone, 2015). Food insecurity acts as a barrier to healthy living and wellbeing (Russell, Flood, Yeatman & Mitchell, 2013; Schroeder & Smaldone, 2015; Tarasuk et al., 2015). People who are food insecure are at risk for increased psychological stress and have a reduced ability to acquire nutritious foods which in turn increases the propensity for chronic diseases (Schroeder & Smaldone, 2015). According to Herman et al. (2015), food insecurity is associated with cost-related medication underuse in people with chronic diseases. Managing chronic diseases is very important especially since approximately 50.9% of the US population is living with a chronic disease (Bauer et al., 2014). Chronic diseases are a burden, and the impact of non-adherence to medication and treatment are increasing (Hamine, Gerth-Guyette, Faulx, Green & Ginsburg, 2015). Achieving improved health outcomes for people with chronic diseases relies on patients' adherence (Hamine et al., 2015).

Chronic Diseases

Hypertension

Hypertension is a preventable and modifiable risk factor for cardiovascular disease and a leading risk factor for myocardial infarction, stroke renal failure, and death

(Basu & Millett, 2013; Escott-Stump, 2015; Hall, Lee, Clark & Perilla, 2014; James et al., 2014). Hypertension is a serious public health problem that affects one in three people in the United States and has the highest prevalence among African Americans (Grant et al., 2015; James et al., 2014). Many studies have shown the importance of antihypertensive medication in the treatment and control of hypertension (James et al., 2014). Medication non-adherence in people using anti-hypertensive medication could negatively impact cardiovascular health and provoke inadequate blood pressure control (Bilal et al., 2015; Tomaszewski et al., 2014). Results from a study of hypertensive participants (n=113) showed medication nonadherence in 77 participants, and disease complication in 71.43% of those 77 participants, with 22.12% citing unaffordability as one of the reasons for non-adherence to medication (Bilal et al., 2015). In another study of hypertensive patients (n=208) with poor blood pressure control, 25% were partially or completely nonadherent the antihypertensive regimen (Tomaszewski et al., 2014).

Diabetes Mellitus

Diabetes mellitus (DM) is a non-communicable disease that is a public health problem with global prevalence (Asif, 2014). DM refers to a group of metabolic diseases that cause hyperglycemia due to flaws in insulin production and or secretion and is associated with long-term damage, dysfunction, and failure of various organ systems (Escott-Stump, 2015). The American Diabetes Association estimates that DM affects approximately 25.8 million Americans (Escott-Stump, 2015). DM affects many low-income Americans and could play a role in poor outcomes, with type 2 DM being high in

the USA (Heerman et al., 2015; Ippolito et al., 2016). There are four etiologic classifications of DM which are Type 1 DM, Type 2 DM, Gestational DM (GDM), and other types of DM caused by genetic defects, diseases of the exocrine pancreas, or drug or chemical induced DM (Escott-Stump, 2015).

Type 1 DM is an autoimmune disease with an assumed abrupt onset, mediated by T- cells, and destroys the beta-cells of the pancreas (Huether & McCance, 2012). Type 1 DM affects macronutrient metabolism resulting in glucose accumulation in the blood, and in the urine if glucose levels exceed the renal levels (Huether & McCance, 2012). The management of DM relies heavily on medical nutrition therapy formally known as diet therapy and self-management which could be impacted by food insecurity (Asif, 2014; Escott-Stump, 2015; Ippolito et al., 2016). Asif (2014) highlights that dietary treatment of DM is meant to improve the health of people living with DM. The purpose of dietary treatment of DM uses balanced nutrition to: improve health, achieve optimal blood glucose and lipid concentrations, and provide enough energy for optimal weight, and normal growth and development including pregnancy and lactation (Asif, 2014). Food insecurity could impact DM management especially when people rely on inexpensive foods that are unsuitable for adequate glycemic control, when they binge eat whenever food is available, and choose between food and medication (Heerman et al., 2015; Ippolito et al., 2016).

Food insecurity has a significant impact on the management of DM, as well as being a risk factor for developing DM (Gucciardi, Vahabi, Norris, Del Monte & Farnum,

2014). Results from a prospective longitudinal study in Puerto Rico (n = 584) showed that participants who were food insecure reported lower diet quality and intake of fruits and vegetables (Berkowitz, Gao & Tucker, 2014). Conclusions of that study indicated an association between food insecurity and low diet quality and poor glycemic control (Berkowitz et al., 2014a). Results from a cross-sectional study of people living with DM (n=1237) who use food pantries in Sonoma County, California; Columbus, Ohio; and Corpus Christi, Texas, showed poorer DM self-management in those who were experiencing food insecurity (Ippolito et al., 2016).

Food insecurity is strongly associated with medication non-adherence in people with DM type 2. Silverman et al. (2015) conducted a secondary analysis of data from a randomized controlled trial of people with type 2 diabetes (n=287) from November 2011 to October 2013. Results from this study showed that participants with food insecurity were more likely to have low medication adherence, in addition to depression and diabetes distress, and extremely poor diabetes control (Silverman et al., 2015). Furthermore, results from a cross-sectional analysis of data (n= 401) by Heerman et al. (2015) show an association between food insecurity and greater incidences of non-adherence to medication.

Obesity and Overweight

Food insecurity, overweight, and obesity, demographic and socioeconomic factors are all associated (Cheung et al., 2015; Gundersen, 2013). Individuals with lower socioeconomic status are disproportionately affected by food insecurity and obesity.

Approximately 69% of American adults are affected by obesity or overweight, with rates being higher for African Americans and Hispanic adults and children (Rogers, Kegler, Berg, Haardörfer & Frederick, 2016). Sarlio-Lahteenkorva and Lahelma (1999) suggest that food insecure households involuntarily use unhealthy coping strategies based on the time of the month or access and availability of healthy food. Pan, Sherry, Njai and Blanck (2012) used data from the Behavioral Risk Factor Surveillance System [BRFSS], 2009 to examine the association between food insecurity and obesity in adults in 12 participating states (n = 66,553). Results from the study showed that one in three adults met the criteria for obesity, while the odds of being obese were 32% for food insecure adults (Pan et al., 2012). Obesity was significantly higher among food insecure subgroups of non-Hispanic whites, non-Hispanic blacks, adults over 30 years old, adults with some college education and a college degree, and households with incomes under $25,000.00, or between $50,000.00 and $74,000.00 (Pan et al., 2012).

HIV/AIDS

HIV is a global public health problem that has no cure, but the virus can be controlled with effective medical care including antiretroviral therapy (ART). Antiretroviral therapy prolongs the lives of people infected with HIV, while also reducing the risk of infecting others (Centers for Disease Control and Prevention [CDC], 2018). Optimal adherence to ART is necessary to achieve maximum suppression of the replication of HIV, and long-term survival (Chesney, 2000; Idindili, Jullu, Mugus & Tanneri, 2012). Food insecurity and poor adherence to treatment are potential risks for

poor response to medication which causes incomplete viral suppression (Aibibula et al., 2016).

For people living with HIV, adherence to ART is fundamental to reducing mortality and morbidity of the disease (Younge et al., 2013). However, according to Young et al. (2013), and Kalichman et al. (2014) for people living with HIV/AIDS, food insecurity is an emerging barrier to medication adherence, and this worsens clinical outcomes. Young et al. (2013) allude to the negative impact of food insecurity on medication adherence noted by many qualitative studies in South America and Sub-Saharan Africa. Food insecurity was notably associated with non-adherence to ART in a study with participants (n = 898) receiving ART (Musumari et al., 2014). Furthermore, results from a study that investigated the various aspects of poverty among people living with HIV and experience food insecurity, showed that those experiencing food insecurity were less adherent to antiretroviral treatment (ART) than those who were food secure (Kalichman et al., 2014).

Summary

In this chapter, I reviewed the literature that was pertinent to the study. I began by providing a brief description of the chapter and how it was divided. I briefly described my literature search strategy, followed by a description of the theoretical framework -the SEM that would guide the study. I explored the relationship between food insecurity and the management of illnesses using the socio-ecological model to depict the mutual determinism between personal factors, the environment, and behavior. I looked at food

insecurity and how it affected health by highlighting the fact that people who are food insecure consume less nutritious diets in comparison to those who are food secure. I further highlighted the importance of proper nutrition being among the most effective methods of nourishing the body to promote growth and development and reducing the risk for disease and associated risk factors. Healthcare costs were also discussed in this chapter, alluding to the fact that costs are rising, which makes this a serious problem. I also reviewed the various chronic diseases, some of which are preventable and are also associated with poor nutrition and food insecurity. Results from studies showed that food insecurity contributed to people with hypertension and diabetes mellitus not adhering to their medication regimen. The research methodology is discussed in Chapter 3.

Chapter 3: Methodology

The purpose of this quantitative study was to assess the impact that food insecurity has on the management of illnesses in families and determine whether there is an association between food insecurity and poor illness management. This chapter describes the methodology that was used to collect and analyze the data for this study. This chapter provides details about the research design and methods for this study and will analyze primary data from a participant survey. I reviewed each of the research questions and provided a rationale for using multiple regression and correlation to determine the relationship between food insecurity and management of illness as well as receiving food assistance and adherence to medication. This chapter summarizes the study population, sample size, and sampling and recruitment procedures. The purpose of this quantitative study was to assess the impact that food insecurity has on the management of illnesses in families and determine whether there was an association between food insecurity and poor illness management.

Research Design and Rationale

This dissertation used cross-sectional survey research based on a random sample from Wayne County, Ohio, with the purpose of generalizing regarding food insecurity and management of illnesses in Wayne County's low-income population. Cross-sectional studies are used in research to explore relationships between variables and collect information on disease prevalence, behaviors, knowledge, attitudes, and opinions (Connelly, 2016). The cross-sectional survey method was appropriate for this study

because this method is inexpensive, quick and can encompass different aspects of human behavior while capturing information of a specific point in time (Connelly, 2016). While cross-sectional studies using surveys are advantageous, their limitations should be noted. Limitations include response rate, nature of data being self-reported, bias and the inability to demonstrate changes over time (Connelly, 2016).

The dependent variable was adequacy of medication use for specific illnesses, and the independent variable was food insecurity status (see Table 2). Adequacy was measured in terms of appropriate medication usage based on skipping, reducing doses, delaying refills, or taking less effective medication. Covariates were categorized as demographic (age and gender), clinical (diabetes, hypertension, kidney disease, HIV/AIDS, depression, cancer, and other diseases), and socioeconomic (participation in SNAP, WIC, or any other Federal Nutrition Assistance Programs). The target population for this study was randomly selected families experiencing food insecurity who reside in main cities in Wayne County, Ohio. These families include single, coupled, and extended households headed by adults or an adult between the ages of 18 and 65 who did or did not receive SNAP and WIC benefits.

Table 2

List of Dependent and Independent Variables

Research Questions	*Variables*	*Description*
	Independent variable	*Food insecurity. Measured using data from the initial six questions on the questionnaire*
RQ1	*Dependent variable*	*Adherence to medication for a specific illness. Measured using seven questions related to medication use on the questionnaires*
RQ2	*Independent variables*	*Adherence to medication for a specific illness. Measured using seven questions on the questionnaires*
	Dependent variable	*Use of food assistance programs. Measured using data from two questions on the questionnaire related to the use of food pantries and soup kitchens and receiving SNAP, WIC or other food assistance programs.*

Research Questions, Hypotheses, and Rationale

This quantitative study used two primary research questions:

RQ1: Is there an association between food insecurity and the management of illnesses in Wayne County, Ohio?

$H_0$1: There is no statistically significant association between food insecurity and the management of illnesses in Wayne County, Ohio.

H_a1: There is a statistically significant association between food insecurity and the management of illnesses in Wayne County, Ohio.

RQ2: Is there an association between the use of food assistance programs and medication adherence in terms of the management of illnesses in Wayne County, Ohio?

$H_0$2: There is no statistically significant association between use of food assistance programs and medication adherence in terms of the management of illnesses in Wayne County, Ohio.

H_a2: There is a statistically significant association between use of food assistance programs and medication adherence in terms of the management of illnesses in Wayne County, Ohio.

RQ1 addressed whether food insecurity has an association with the management of illnesses, while RQ2 addressed whether receiving assistance from food assistance programs such as food pantries, WIC, and SNAP has a relationship with medication adherence in terms of management of illnesses in Wayne County, Ohio. The goals of the two questions were to determine associated relationships between variables. To provide answers that will help determine these relationships, participants responded to a questionnaire (see Appendix A).

Some basic descriptive statistical analyses were conducted to describe the typical characteristics of the sample. Further analyses were done to determine significance in

terms of the association between food insecurity and the covariates and dependent variables. If statistical significance was found, further analyses were conducted. Logistic regression analyses were conducted to assess the association between food insecurity and management of illnesses. The level of significance for this study was $p <. 05$, the statistical power of this study was 62%, and the alpha level was $\alpha = .05$.

This study sought to use the information collected from the survey to make inferences about characteristics, attitudes, and behaviors regarding food insecurity and the management of illness. This study specifically analyzed the impact of food insecurity on the management of illness and medication adherence in Wayne County, Ohio. Managing illnesses requires nutrition, lifestyle modifications and adherence to medication. For example, managing hypertension requires combining medication use with modifying certain dietary components (Nguyen, Odelola, Rangaswami & Amanullah, 2013; Oparil & Schmieder, 2015). This research used a survey to answer the research questions and various statistical methods to test the hypotheses. The survey is the preferred method of data collection because of its economy and quick turnaround during data collection (Creswell & Creswell, 2013).

Sampling and Data Collection

Population and Sampling

Random cluster sampling was used so that every person from Wayne County was equally likely to be included in the study (Banerjee & Chaudhury, 2010). The proposed study population was 583 (n=583) but the current study population was 130 (n=130). The

original sample size (n = 583) was calculated using G*Power 3.1.9.2 software. A total of 650 paper questionnaires (n=650) were distributed at various locations in Wayne County, Ohio and online at the request of some participants. Locations included food pantries, Wayne Medina Community Action, and other public places. Some of the participants requested an online version of the survey, which was distributed as an anonymous link along with the informed consent.

The sample population was stratified before selection so that the sample represented the true proportion of people experiencing food insecurity. The stratification was gender, age, WIC or SNAP recipients, food pantry, food banks, and soup kitchen users. Participants came from a random cluster sample of Wayne County Ohio families who experience food insecurity and included single, coupled, or extended households headed by adults or an adult between the ages of 18 and 65 years old. The family units were also insured or uninsured, receiving or not receiving SNAP or WIC benefits, and also using or not using food pantries, food banks, and soup kitchen resources. Participants younger than 18 years of age and older than 65 years of age, and those residing out of Wayne County were excluded from the study.

Instrumentation and Materials

The questionnaire that was used to assess food insecurity and medication adherence is a modified version of the Georgia (GA) Advanced POMP6 Study (GA Advanced POMP6). The GA Advanced POMP6 Study was conducted between July and November 2008 with (n = 4,731) new and added waitlisted participants of the Older

Americans Act Nutrition Program (OAANP) (Lee, Johnson, Brown & Nord, 2011). The GA Advanced POMP6 questionnaire consisted of 122 questions divided into health-related questions, food security questions, food and nutrition risk questions, food and nutrition intake questions, food acquisition questions, health, and medication management questions, and demographics (Lee et al., 2011). To assess food insecurity during the last 30 – day period in the GA Advanced POMP6 study, and to reduce the high response burden, Lee et al. (2011) used a modified version of the nationally validated HFSSM standard 6-item survey, since the 10 to 18 question version was considered too lengthy (Lee et al., 2011). The original questionnaire is found in Appendix C, and documents related to permission to use the questionnaire are found in Appendix D

The modified questionnaire for this dissertation found in Appendix A, consists of 28 questions adapted from the food security, food and nutrition risk and the health and medication management sections of the GA Advanced POMP6 questionnaire. This questionnaire is appropriate because it asks questions that are pertinent to this study.

For this study, data were collected between December 10, 2018, and March 10, 2019, using the cross-section survey method. Questionnaires were distributed at public places in Wayne County such as PTO meetings, public meeting places, Wayne County health fair, food pantries, food banks, Community Action office, Viola Stratzman free clinic, and Wayne County Veteran's Affairs office, which ensured strict random sampling. Informed consent was obtained before completing the questionnaire, and participants were given detailed information about the purpose of the study, and the

anonymity of the information collected. Responding to the questionnaire served as a participant's consent to participate in the study. This study did not require follow- up from participants, and any participant who wished to decline answering the questionnaire did so freely. Questionnaires were distributed and collected in sealed pre-marked collection boxes at the places of recruitment. Data from the questionnaires were collected, coded and entered in the SAS program for analysis. All data was stored on a flash drive for safekeeping.

Data Analysis

The confidence interval was +/- 5, the level of significance for this study was $p < .05$, the statistical power was 62%, the confidence level was 95%, and the alpha level was $\alpha = .05$. I used univariate analysis to provide descriptive statistics for all variables. Bar graphs, percentages, and frequencies were used to describe categorical variables and histograms, measures of dispersions, and measures of central tendency for continuous variables. I used logistic regression analysis for RQ1 to quantify associations between food insecurity and management of illness in Wayne County, Ohio. Similarly, I used logistic regression analysis for RQ 2 to quantify associations between the use of food assistance programs, and adherence to medication in Wayne County, Ohio.

Odds and Odds Ratios

Odds is the probability of an event occurring relative to the probability of it not occurring (Allison & Allison, 2012). For example, the number of "yes" responses to the question "have you ever skipped doses of medication because of cost" can be estimated

as the ratio of the number of respondents who answered "no." Odds were estimated for different subgroups of respondents, and then the odds ratio was calculated as the ratio of the odds from two groups being compared.

Measures

Food Insecurity

Food insecurity was assessed over a 30-day period using a modified version of the 6-item USDA HFSSM food security questionnaire (Table 3). The six questions assessed food security and based on scores; participants were classified as either food secure or food insecure. For the six questions assessing food insecurity, the responses of yes, yes on 3 or more days, yes on 1 or 2 days, often, or sometimes received a score of 1, while the responses of never or no received a score of 0. Responses were tallied, and responses with a score of 0 to 1 were classified as food secure, while responses with scores between 2 to 6 were classified as food insecure. This scoring method was adopted from the U.S. Household Food Security Survey Module: Six-Item Short Form (ERS, 2012).

Based on the USDA's classification of food insecurity a raw score of 0-1 is classified as high or marginal food security, and a raw score of 2-4 and 5-6 are considered low and very low food security respectively (ERS, 2012). Furthermore, according to the USDA, scores of 0-1 are classified as food secure, and the raw scores of 2-4 and 5-6 are combined and classified as food insecure. Based on the USDA's suggested scoring, I assigned 0 to persons with a score of 0 or 1 and classified them food

secure, while those with scores of 2 to 6 were assigned a score of 1 and classified as food insecure (ERS, 2012).

Table 3

Summary of Food Security Questions

Food Security Questions
During the last 30 days, how often was this statement true: 1. The food that we bought just didn't last, and we didn't have money to get more. During the last 30 days, how often was this statement true: 2. We couldn't afford to eat balanced meals. 3. In the past 30 days, did you or other adults in your household ever cut the size of your meals because there wasn't enough money for food? 4. In the past 30 days, did you or other adults in your household ever skip meals because there wasn't enough money for food? 5. In the last 30 days, did you ever eat less than you felt you should because there wasn't enough money to buy food? 6. In the last 30 days, were you ever hungry but didn't eat because you couldn't afford enough food?

Chronic Diseases

Disease diagnosis of chronic diseases was assessed with the following question: Has a doctor, nurse, or other health professional ever told you or anyone in the home that you had/have any of the following: high blood pressure (hypertension), heart attack (myocardial infarction), angina/coronary heart disease, stroke, arthritis, rheumatoid arthritis, gout, lupus, fibromyalgia, type I diabetes, type II diabetes, osteoporosis, obesity,

depression, and ADD. Participants were asked to check all that applied and also list any other chronic diseases not listed in the responses (Bengle, 2009). Responses were grouped into 0-1, 2-3 and 4+.

Medication Adherence

Medication non-adherence was assessed using seven questions (Table 4) from the GA Advanced POMP6 Study (Lee, Johnson, Brown & Nord, 2011). These questions are based on a comprehensive summary of documented cost-related medication non-adherence behaviors (Bengle, 2009). The seven questions assessed medication non-adherence over a 30-day period prior to completion of the questionnaire. Answer options to these seven questions were “yes” or “no” with “yes” receiving a score of 1 and "no” answers receiving a score of 0. Participants who responded no to all of the seven questions received a total score of 0 and were considered to be in adherence. On the other hand, participants who answered yes to any of the seven questions and received a score of 1 and above were considered non-adherent. Scores were then classified as 0 or 1, with a score of 0 representing medication adherence while a score of 1 represented medication non-adherence.

Table 4

Summary of Adherence to Medication Questions

Adherence to Medication Questions
1. Have you ever skipped doses of a medicine because of the cost?
2. Have you ever taken a smaller dose of medicine than was prescribed by your doctor

Table continues

because of the cost (Example: cutting pills in half)?

3. Have you ever delayed refills of prescriptions because of the cost?
4. Have you ever stopped taking medicines because of the cost?
5. Have you ever avoided new prescriptions because of the cost?
6. Did you ever take less effective prescription medications than those initially prescribed by your doctor because of the cost?
7. Did you ever switch to an over-the-counter alternative to a prescription medication because of the cost?

Income, Household Size, Gender, and Out-of-Pocket Cost for Prescribed Medication

Income was classified into two categories: below $20,000.00 and above $20,000.00. Income of below $20,000.00 was coded as 1 and income above $20,000.00 was coded as 2 (Table 5). Household size categories ranged from 1 person to 7 or more people, and each category was given a score ranging from 1 to 7 (Table 5). Gender was categorized as male, female and other, and each category received a code of 1, 2 or 3 respectively (Table 5). The out-of-pocket cost for prescribed medication was categorized from $0 to greater than $300 per month. Each category was coded from 0 to 7 (see Table 6).

Table 5

Summary of Codes Assigned to the Variables Income and Household Size

Variables	Scores
Income	
Below $20,000.00	1

Table continues

Above $20,000.00	2
Household size	
1 person	1
2 people	2
3 people	3
4 people	4
5 people	5
6 people	6
7 or more people	7

Table 6

Summary of Codes Assigned to the Variables Gender and Out-of-Pocket Costs of Prescribed Medication

Variables	Scores
Gender	
Male	1
Female	2
Other	3
Out-of-Pocket Cost for Prescription Medication	
$0	0
$1- $50 per month	1
$51- $100 per month	2
$101- $150 per month	3
$151- $200 per month	4
$201- $250 per month	5
$251- $230 per month	6
Greater than $300 per month	7

Quantifying Associations Between Food Insecurity and Medication Adherence

The association between food insecurity and medication adherence was quantified, and odds and odds ratios estimated through binary logistic regression for responses with two categories (food insecure and food secure). On the other hand, odds and odds ratios were estimated through ordinal logistic regression for responses with three categories (often, sometimes, never). Binary variables for measures of food insecurity were assigned codes of 0 or 1 (representing food secure and food insecure, respectively), and codes of 0 or 1 (representing adherence and nod-adherence respectively) were assigned to responses to questions related to medication adherence.

Quantifying Associations Between Nutrition Assistance Programs, Income, and Medication Adherence

The association between use of nutrition assistance programs and medication adherence was quantified, and odds and odds ratios estimated through binary logistic regression for responses with two categories (yes, no). Codes of 0 or 1, representing adherence and non-adherence respectively were assigned to medication adherence, while for the use of food assistance programs (independent variable), responses with two levels were assigned 0 or 1 (yes, no respectively), and 1,2, or 3 were assigned to variables with three levels (often, sometimes, never). A separate model was fitted for each measure of medication adherence (coded as 0 or 1) using the LOGISTIC procedure of SAS, with indicators of use of nutrition assistance programs and income as independent variables. First, I fitted the models with all the independent variables and the non-significant

variables were eliminated using the backward stepwise variable selection option ($p > 0.10$).

Threats to Validity

External validity refers to the generalizability of the results to the population or to other scenarios or other times (Trochim, 2006). In other words, how true would the conclusions be for other communities in the same situation, or if the participants of the current study are representative of the population? A potential threat to the external validity of this study would have been making incorrect generalizations. To improve the external validity of this study, I used random sampling and tried to keep withdrawals at a minimum. Construct validity refers to the adequacy and generalizability of the instrument (questionnaire) used in the study (Trochim, 2008). In other words, is the questionnaire being used in the study appropriate to answer the research questions? I did not have any threats to construct validity since the questionnaire was being used is adapted from one that was already tested, and its validity is proven. According to Lee et al. (2011), the results of the study that used the short form of the HFSSM questionnaire showed that the data was comparable to national food security data.

IRB Approval and Ethical Considerations

IRB approval was sought after the oral defense of the dissertation proposal and was received on December 5, 2018, from Walden University's Institutional Review Board (IRB approval # 12-05-18-0251859). This study did not involve experiments carried out on human subjects. However, it involved adult human participants between

the ages of 18 and 65 answering questions on a survey. Participation in the study was voluntary, and the nature and purpose of the study were thoroughly explained to the participants. Participants were provided with a consent form (Appendix B) written in clear and concise language. After reading the informed consent form, completing the survey served as consent to participate. Participant confidentiality was protected since the only identification that on the questionnaire was the zip code. The responses were anonymous since names, phone numbers or addresses were not required on the questionnaires. However, as foreseen, some participants were reluctant and refused to answer the questionnaires.

Summary

This chapter provided details about the methodology of the study. This chapter began with a description and discussion of the research design and rationale for its use. I also detailed the research questions and the hypotheses for each question in addition to stating the goal for each question. I addressed sampling and data collection and population demographics. I discussed the instrumentation (questionnaire), coding, data analysis, and sampling procedure.

Chapter 4: Results

This chapter reviews the results of the study and provides a description of its results. The purpose of this study was to examine the impact of food insecurity on the management of illnesses in low-income families in Wayne County, Ohio. In this study, I analyzed primary data collected from questionnaires that were distributed in Wayne County. This chapter provides the demographics of the study population from major cities in Wayne County, results from logistic regression analyses that were used to test hypotheses and measure associations, and an overall summary of the results, which includes tables and graphs for each research question. For this study, I used a quantitative cross-sectional survey design to examine the association between food insecurity and management of illnesses, as well as the use of food assistance programs and medication adherence in the management of illnesses among 130 participants. I examined self-reported measures of food insecurity (measured using the short version of the USDA food security survey) and adherence to medicine among Wayne County residents between the ages of 22 and 65. SAS statistical software was used to conduct all statistical analyses.

Data Collection

The number of participants in this study totaled 130 (n = 130). A total of 650 paper questionnaires were distributed at various locations in Wayne County, Ohio that included food pantries, community action office, and other public places. Some participants requested an online version of the survey, which was distributed as an

anonymous link along with the informed consent form. Of the 650 distributed paper questionnaires, 400 (61.5%) were returned, and 250 (38.5%) were not returned. Of the 400 returned questionnaires, 86 questionnaires (21.5%) were complete and usable, 200 (50%) were incomplete, and 114 (28.5%) were blank, thus rendering them incomplete and unusable. The incomplete paper questionnaires contained all or one of the following: unanswered questions, no zip codes, or no age. There were 48 online survey responses with 44 (91.6%) complete and usable and four (8.3%) incomplete and unusable. Incomplete online questionnaires were due to two missing zip codes, one missing age, and one questionnaire with unanswered questions (see Table 7).

Table 7

Summary of Survey Distribution

	N	*%*
Paper Questionnaires		
Distributed	*650*	
Not Returned	*250*	*38.4*
Returned	*400*	*61.5*
Complete	*86*	*21.5*
Incomplete	*200*	*50*
Blank	*114*	*28.5*
Online Version of Questionnaires		
Answered	*48*	
Usable	*44*	*91.6*
Unusable	*4*	*8.3*

Sociodemographic Characteristics

This study was comprised of 130 participants of which the majority (*N* = 100; 76.9%) was female, while there were 30 (23.2%) male participants were 30 (see Table 8). The age distribution of the sample population ranged from 22 to 65(see Figure 5). The ages were grouped into three categories: 22-33 years (*N* = 27; 20.8%), 34-45 years (*N* = 42; 32.3%), and 46-65 years (*N* = 65; 46.9%). The number of participants who responded that they earned an annual income in 2018 of less than $20,000.00 per year was 62 (47.7 %), while those who earned more than $20,000.00 per year was 68 (52.3 %; see Table 8). Based on the responses, there were 20 (15.4%) participants who were classified as food secure and 110 (84.6%) classified as food insecure. Sixty-six participants (50.8%) said that they never used food pantries/soup kitchens, while 34 (26.2%) said they did so often and 30 (23.1%) did so sometimes. Eighty-two respondents (63.1%) stated that they did not receive SNAP/WIC/other federal assistance, while 48 (36.9%) stated that they received some form of SNAP/WIC/other federal assistance (see Table 8). Based on responses, the number of participants who were classified as adhering to medication use was 61 (46.9%), while those classified as nonadherent was 69 (53.1%). Ninety-two participants (70.8%) were from zip code 44691, 14 (10.8%) were from zip code 44667, and the remaining 47 (27.1%) came from the zip codes 44217, 44270, 44287, 44618, 44627, 44645, 44676, and 44677.

Table 8

Descriptive Statistics: Sociodemographic Characteristics of Study Participants

(n – 130)	N	%
Age groups		
22 - 33	27	20.8
34 - 45	42	32.3
46 – 65	61	46.9
Gender		
Male	30	23.1
Female	100	76.9
Annual household income		
<$20,000.00	62	47.7
>$20,000.00	68	52.3
Health insurance		
Yes	101	77.7
No	29	22.3
Food Insecurity		
Food Secure	20	15.4
Food Insecure	110	84.6
Food Assistance Programs		
WIC/SNAP/Other Federal Nutrition Assistance		
Yes	48	36.9
No	82	63.1
Pantry/Soup Kitchen		
Often	34	26.2
Sometimes	30	23.1
Never	66	50.8
Adherence to medication		
Adherence	61	46.9
Nonadherence	69	53.1

Note: N = Number, % = percentage

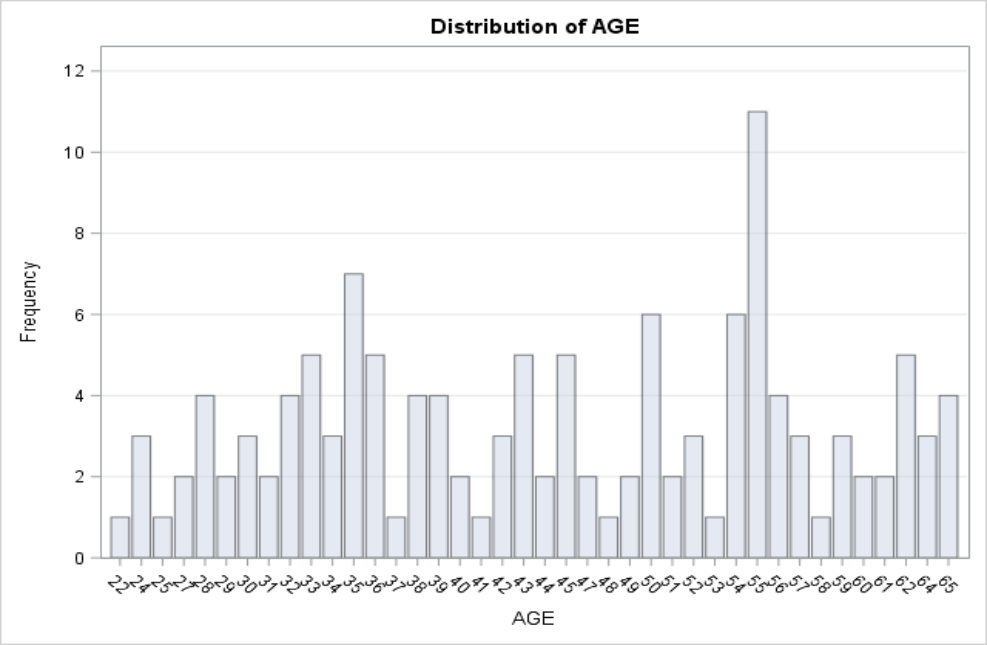

Figure 5. Graph showing age distribution.

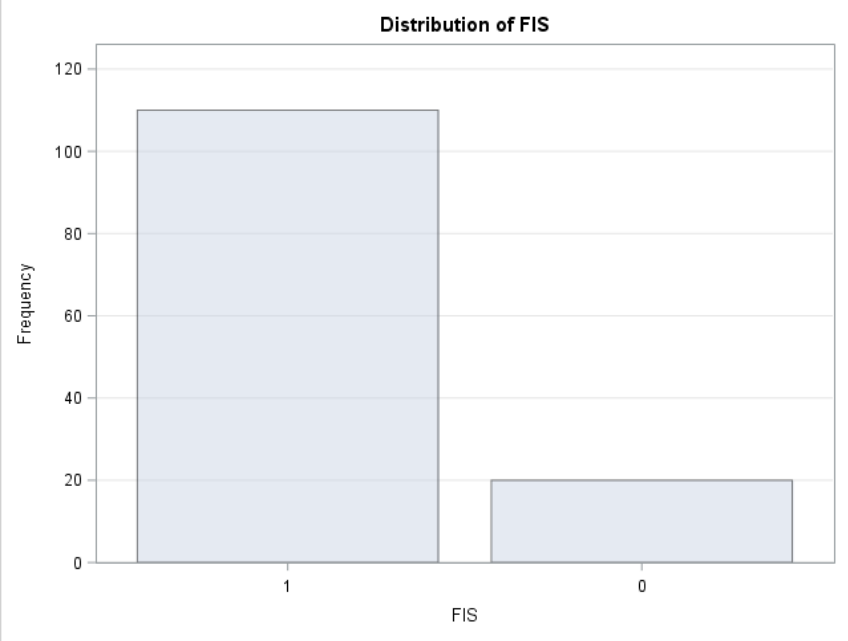

Figure 6. Graph showing food insecurity classification.

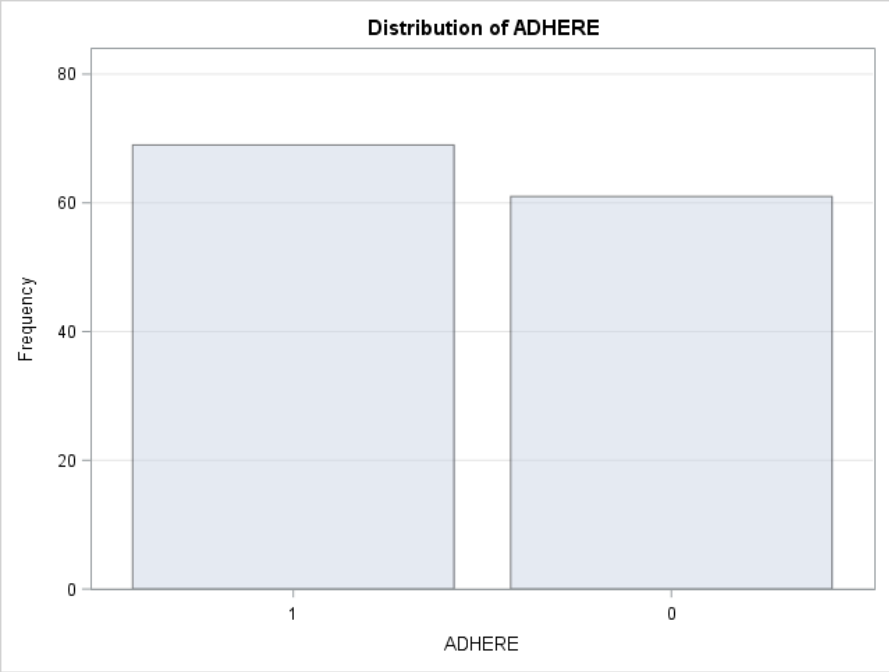

Figure 7. Graph showing adherence to medication classification.

Research Question and Hypotheses Testing

In this study, I asked two research questions for which I have provided results for each of the analyses conducted for each question.

RQ1 and Hypotheses

RQ1: Is there an association between food insecurity and the management of illnesses in Wayne County, Ohio?

$H_0$1: There is no statistically significant association between food insecurity and the management of illnesses in Wayne County, Ohio.

H_a1: There is a statistically significant association between food insecurity and the management of illnesses in Wayne County, Ohio.

Quantifying Associations Between of Food Insecurity and Medication Adherence

To answer RQ1, logistic regression was used with food insecurity predicting medication adherence. The results were statistically significant with food insecurity predicting medication adherence (= 0.0096) (see Table 9 and Figure 8). Participants who were food insecure were four times more likely to be non-adherent to medication than those who were food secure (OR = 4.174; p = 0.0096). Participants who responded "often" and "sometimes" to "the food we bought just didn't last" were four times more likely to skip medication than those who responded "never" (see Table 10). Likewise, participants who responded "often" or "sometimes" to "we couldn't afford to eat a balanced meal" were four times more likely to skip medication than those who responded "never". Furthermore, participants who responded, "yes on 3 or more days" or "yes on 1 or 2 days" to "in the past 30 days, did you or other adults in your household ever cut the size of your meals because there wasn't enough money for food" were three times more likely to skip medication than those who responded "no". Also, participants who responded, "yes on 3 or more days" or "yes on 1 or 2 days" to "in the past 30 days, did you or other adults in your household ever skip meals because there wasn't enough money for food" were three times more likely to skip medication than those who responded "no". Respondents eating habits related to eating less (Q5) and being hungry (Q6) did not have a significant association with adherence to medication (see Table 10). The null hypothesis for RQ 1 was rejected.

Table 9

Maximum Likelihood Estimates, Odds Ratios, and Corresponding Statistics for Association Between Food Insecurity and Adherence to Medication

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	OR
Intercept		1	-1.0986	0.5164	4.5261	0.0334	0.333
FIS	1	1	1.4289	0.5514	6.7152	0.0096	4.174

Note: FIS 1 = Food Insecurity

Table 10

Maximum Likelihood Estimates, Odds Ratios, and Corresponding Statistics for Association Between Food Insecurity and Adherence to Medication

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	OR
Q1	0	1	1.4932	0.4005	13.9029	0.0002	4.45
Q2	0	1	1.3792	0.3885	12.604	0.0004	3.97
Q3	0	1	1.1377	0.3658	9.6729	0.0019	3.12
Q4	0	1	1.2726	0.3755	11.4824	0.0007	3.57
Q5	0	1	0.6252	0.3905	2.5636	0.1093	1.87
Q6	0	1	0.3314	0.3618	0.8386	0.3598	1.39

Note: Q 1- Q 6 = Questions 1 - 6

Table 11

Odds Ratio Estimates for Association Between Food Insecurity and Adherence to Medication

Effect	Point Estimate	95% Wald Confidence Limits	
FIS 1 vs 0	4.174	1.416	12.299

Note: FIS 1 = Food Insecurity, FIS 0 = Food Security

Figure 8. Graph showing association between food insecurity and adherence to medication.

RQ2 and Hypotheses

RQ2: Is there an association between the use of food assistance programs and medication adherence in terms of the management of illnesses in Wayne County, Ohio?

$H_0$2: There is no statistically significant association between use of food assistance programs and medication adherence in terms of the management of illnesses in Wayne County, Ohio.

H_a2: There is a statistically significant association between use of food assistance programs and medication adherence in terms of the management of illnesses in Wayne County, Ohio.

Quantifying Associations Among the Use of Nutrition Assistance Programs, income and Medication Adherence

To answer RQ2, logistic regression was used with the use of food assistance programs predicting medication adherence. The results were statistically significant with the use of food assistance programs predicting medication adherence (see Table 12). Participants who used food pantries, or soup kitchens often (Q7), were four times more likely to be non-adherent to medication that those who responded never to using food pantries and soup kitchens (OR = 4.305; p = .0088). Whereas, those participants who used food pantries, or soup kitchens sometimes, were equally likely to be non-adherent to medication as those who never used food pantries and soup kitchens (OR= 1.697; p=.302). People who responded "yes" to receiving WIC, SNAP or other federal assistance (Q 8) were three times more likely to be non-adherent to medication than those who responded "no" to receiving WIC, SNAP or other federal assistance (OR= 3.33{1/0.351}; p=.0288). The null hypothesis for RQ 2 was rejected.

Table 12

Maximum Likelihood Estimates, Odds Ratios, and Corresponding Statistics for Association Between the Use of Federal Food Assistance Programs and Adherence to Medication

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	OR
Intercept	1	0.2159	0.2739	0.6218	0.4304	1.241

Table continues

Parameter		DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	OR
FIS	0	1	-1.3440	0.5799	5.3702	0.0205	0.261
Q7	1	1	1.4598	0.5569	6.8722	0.0088	4.305
Q7	2	1	0.5287	0.5123	1.0649	0.3021	1.697
Q8	1	1	-1.0482	0.4795	4.7786	0.0288	0.351

Note: FIS 1 = Food Insecurity, Q7 1 = Use of food pantries, soup kitchens often, Q7 2 = Use of food pantries, soup kitchens sometimes, Q8 1 = Yes, receive WIC, SNAP or other Federal Nutrition Assistance.

Of the independent variables considered, food insecurity and use of food pantry and soup kitchens, were the variables most significantly was associated with the questions related to medication adherence (Table 13). On the other hand, receiving WIC, SNAP and other Federal Food Assistance and age were each significantly associated with three of the questions related to adherence to medication, while income was only associated with one of the questions associated with adherence to medication (Table 13).

Table 13

Probability Values for Wald χ^2 from Binary Logistic Regression Analyses of Estimates for Association Between the use of Federal Food Assistance Programs and Adherence to Medication

Independent	Measures of Medicine Adherence							
Variables	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Overall
FIS	0.0594	NS	0.0434	0.0254	0.0448	0.0276	NS	0.0205
Q7	0.0151	NS	0.0239	0.0083	0.0488	0.0009	0.0404	0.0320
Q8	NS	NS	NS	NS	0.0217	0.0100	0.0238	0.0288
Age	0.0662	0.0398	0.0285	NS	NS	NS	NS	NS
Income	NS	0.0222	NS	NS	NS	NS	NS	NS

Note: FIS = Food Insecurity, Q7 = Question 7, Q8 = Question 8, Q13 - Q19 = Questions 13-19, NS = non-significant.

Questions 13 to 15. Participants classified as food insecure were four times more likely to skip medicine due to cost than participants who were classified as food secure (OR= 4.651{1/.215}; p=.0594), (see Table 14 and Figure 9 A). Participants who responded "often" or "sometimes" to using food pantry or soup kitchens were approximately four times more likely to skip medicine than participants who responded" never" to using food pantry or soup kitchens (see Table 14). However, participants who responded "often" or "sometimes" to using food pantries or soup kitchens were equally likely to skip medication (OR=.985; p=.978). Respondents in the two older groups (33-45 years old, 46-65 years old) were six times more likely to skip medicine than the participants classified in the younger group (22 – 33 years old) (see Figure 9A and Table 14). Similar trends were observed in participants regarding delaying refills of prescriptions because of cost (see Figures 9 B and 9 C). participants whose annual income in 2018 was less than $20,000.00 were approximately three times more likely to take smaller doses of medication than those whose income was more than $20,000.00 for the same year (see Figure 9B).

Table 14

Odds Ratio for Association Between the Use of Federal Food Assistance Programs and each question related to Adherence to Medication

Questions	Effects	Estimate	CL_L	CL_U	*P*
Q13	FIS 0 vs 1	0.215	0.044	1.063	0.0594
	Q7 1 vs 3	3.64	1.336	9.922	0.0116
	Q7 2 vs 3	3.694	1.277	10.685	0.0159
	Q7 1 vs 2	0.9854	0.3354	2.895	0.9786

Table continues

	AGE_GP 1 vs 3	0.159	0.033	0.77	0.0223
	AGE_GP 2 vs 3	0.951	0.379	2.389	0.9152
	AGE_GP 1 vs 2	0.1667	0.03282	0.8468	0.0307
Q14	AGE_GP 1 vs 3	0.068	0.009	0.542	0.0111
	AGE_GP 2 vs 3	0.852	0.339	2.145	0.7344
	INCOME 1 vs 2	2.797	1.159	6.75	0.021
Q15	FIS 0 vs 1	0.193	0.039	0.952	0.043
	Q7 1 vs 3	3.709	1.35	10.189	0.011
	Q7 2 vs 3	2.965	1.022	8.601	0.0455
	Q7 1 vs 2	1.251	0.4128	3.7907	0.6922
	AGE_GP 1 vs 3	0.059	0.007	0.481	0.0082
	AGE_GP 2 vs 3	0.943	0.381	2.335	0.8984
	AGE_GP 1 vs 2	0.063	0.007	0.527	0.0108
Q16	FIS 0 vs 1	0.092	0.011	0.745	0.025
	Q7 1 vs 3	3.947	1.572	9.91	0.0035
	Q7 2 vs 3	2.981	1.077	8.247	0.0354
	Q7 1 vs 2	1.324	0.458	3.832	0.6045
Q17	FIS 0 vs 1	0.286	0.084	0.972	0.045
	Q7 1 vs 3	2.88	1.024	8.098	0.0449
	Q7 2 vs 3	3.146	1.125	8.8	0.029
	Q7 1 VS 2	0.916	0.314	2.672	0.8716
	Q8 1 vs 2	0.337	0.133	0.853	0.022
Q18	FIS 0 vs 1	0.090	0.011	0.767	0.028
	Q7 1 vs 3	9.209	2.769	30.631	0.0003
	Q7 2 vs 3	4.79	1.503	15.261	0.0081
	Q7 1 vs 2	1.9226	0.6024	6.1356	0.2696
	Q8 1 vs 2	0.240	0.081	0.711	0.010
Q19	Q7 1 vs 3	3.422	1.167	10.032	0.025
	Q7 2 vs 3	3.07	1.089	8.655	0.034
	Q7 1 vs 2	1.1148	0.3819	3.2538	0.8424
	Q8 1 vs 2	0.325	0.123	0.861	0.024
Overall	FIS 0 vs 1	0.261	0.084	0.813	0.0205
	Q7 1 vs 3	4.305	1.445	12.823	0.0088
	Q7 2 vs 3	1.697	0.622	4.631	0.3021
	Q7 1 vs 2	2.5375	0.8311	7.7469	0.102
	Q8 1 vs 2	0.351	0.137	0.897	0.0288

Note: Q13-Q19 = Questions 13 – 19, AGE_GP = Age group, FIS 1 = Food insecure, FIS 0 = Food secure.

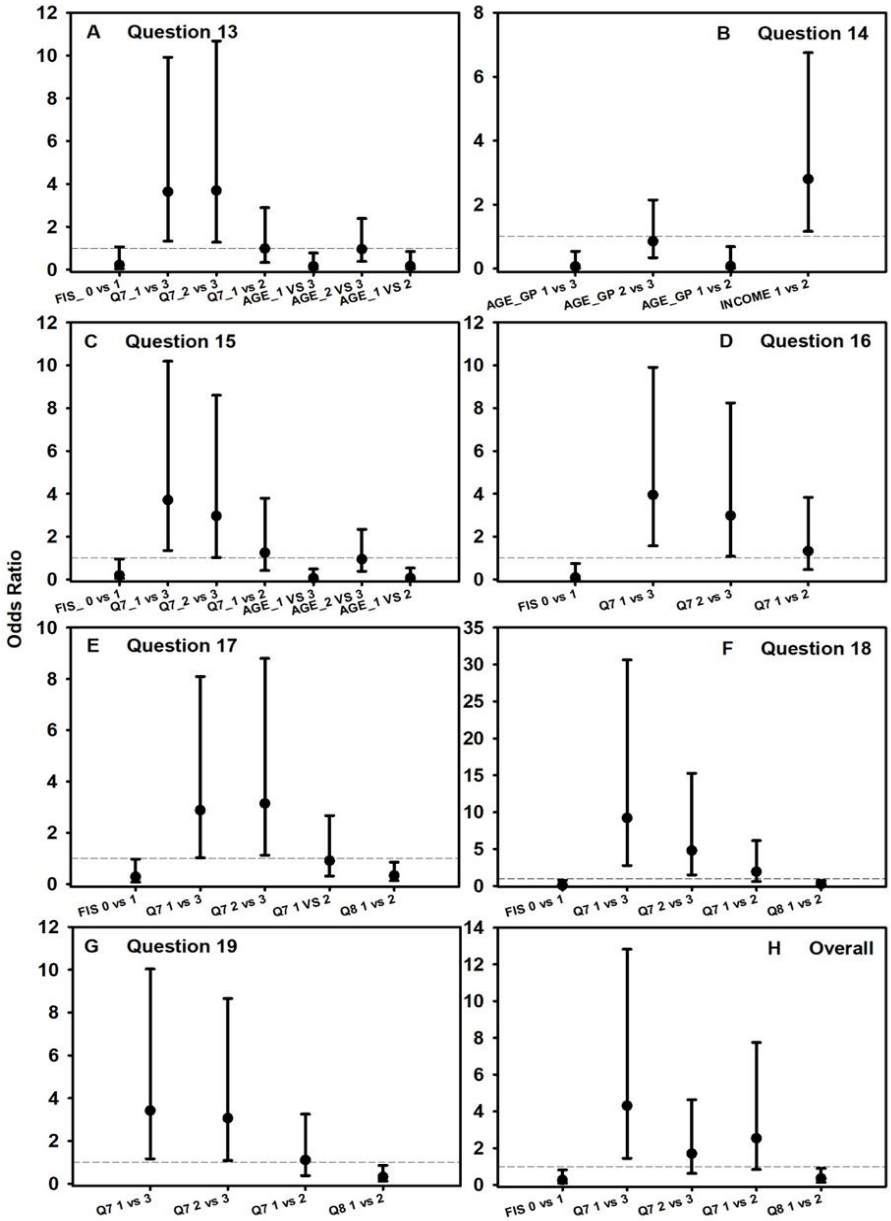

Figure 9. Graph depicting odds ratio for association between use of Federal Food Assistance Programs and each question related to adherence to medication.

Questions 16 to 19. Participants classified as food insecure were more likely to take smaller doses (Q16), delay refills (Q17), or stop taking medicine due to cost (Q18)

than participants who were classified as food secure (Table 14: Figure 9 D, E, F). Participants who responded “often” “or sometimes” to using food pantry or soup kitchens were more than two times more likely to skip medicine due to cost than participants who responded “never” to using food pantry or soup kitchens (Table 14). Participants who responded “no” to receiving WIC, SNAP or other federal food assistance were three to four times more likely to avoid new prescriptions Q17), take less effective prescription medication (Q18), or switch to an over-the-counter alternative (Q19) than those who responded “yes” to receiving WIC, SNAP or other federal food assistance (Table 14).

Summary

This chapter provided the results of this quantitative cross-sectional study to examine the association between food insecurity and management of illness and the association between the use of food assistance programs and medication adherence in the management of illness in 130 participants. Logistic regression analyses were used to test hypotheses and measure associations. The results from these statistical tests showed statistical significance between food insecurity and adherence to medication (OR = 4.174; p =.0096), and statistical significance between the use of food assistance programs and adherence to medication (OR = 4.305; p = .0088; OR=.351; p = .0288). The null hypothesis was rejected for both research questions.

Chapter 5: Discussion, Conclusion, and Recommendations

Introduction

The purpose of this quantitative study was to use primary data to assess the impact that food insecurity has on the management of illnesses in families and determine whether there is an association between food insecurity and poor illness management. This study was based on the premise that food insecurity results in limited abilities to manage various illnesses. The results from this study showed that food insecurity is associated with the management of illnesses and the use of food assistance is also associated with the management of illness. These results will provide insight into the relationship between food insecurity and management of illnesses and promote and encourage social change at the healthcare, community, and individual levels.

Nature of the Study

I analyzed primary data from questionnaires to answer the research questions. The questionnaire that was used to assess food insecurity and medication adherence is a modified version of the GA Advanced POMP6. The modified questionnaire for this dissertation consisted of 28 questions adapted from the food security, food and nutrition risk, and health and medication management sections of the GA Advanced POMP6 questionnaire. Data analysis was conducted on responses from 130 participants between the ages of 22 and 65 who were residents of Wayne County, Ohio.

I used logistic regression analysis for RQ1 to quantify associations between food insecurity (independent variable) and management of illness (dependent variable) in

Wayne County, Ohio. Management of illness was measured by adherence to medication for a specific illness. Similarly, I used logistic regression analysis for RQ2 to quantify associations between the use of food assistance programs (dependent variable) and adherence to medication (independent variable) in Wayne County, Ohio. Furthermore, I used logistic regression for each measure of medication adherence, with indicators of use regarding nutrition assistance programs, age, and income as independent variables.

Interpretation of Findings

RQ1

RQ1: Is there an association between food insecurity and the management of illnesses in Wayne County, Ohio?

Results showed a statistically significant association between food insecurity and the management of illness in Wayne County, Ohio, indicating that people who were food insecure were four times less likely to manage their illnesses (p = .0096). Thought not identical, these findings are comparable to those from an observational study (p=.016) of men and women (n = 59) which showed that missing daily doses of medication over a 45-day period was impacted by hunger (Pellowski et al., 2016). Furthermore, results from a cross-sectional study of adults (n=1237) from Sonoma County, California, Columbus, Ohio, and Corpus Christi, TX showed that self-management of diabetes became increasingly difficult as food security decreased (Ippolito et al., 2016). Similarly, results from another study conducted with 503 participants showed that those who were food and housing insecure were more likely to report diverting from their antiretroviral

medications than those who were food and housing secure (Surratt, O'Grady, Levi-Minzi & Kurtz, 2014). Follow-up studies in Wayne County regarding much larger populations would be needed before broader conclusions could be drawn and comparisons made with other studies. The small sample size of the current study likely resulted in lower statistical power, making it difficult to securely draw such conclusions.

RQ2

RQ2: Is there an association between the use of food assistance programs and medication adherence in terms of the management of illnesses in Wayne County, Ohio?

Food assistance in this study meant food pantries and soup kitchens or receiving WIC, SNAP or other federal assistance. Results showed a statistically significant association between the use of food assistance programs and medication adherence. People who used food assistance were four times more likely to skip medication (OR = 4.305; p = .009; OR=.351; p = .029). These findings were somewhat contrary to those reported by Pooler and Srinivasan, (2019) which showed that adults who participated in SNAP had a significant decrease in cost-related medication non-adherence. Disparities between my study and that of Pooler and Srinivasan, (2019) could be attributed to several factors including the sample population, population demographics, as well as the fact that the Wayne County study was conducted on a relatively small population which likely affected statistical power. Again, follow-up studies on a larger population would be needed before broader conclusions could be drawn about the association between the use

of food assistance programs and medication adherence in the management of illnesses in Wayne County, Ohio.

I used the SEM developed by Urie Bronfenbrenner as the theory to understand factors influencing food insecurity and management of illnesses. The SEM emphasizes various levels of influence on health behaviors and its use allows for closer scrutiny of these factors that shape behaviors (Richard, Gauvin, & Rame, 2011; McLeroy, Bibeau, Steckler, & Glanz,1988). The conceptual model I proposed in Figure 4 served to summarize the results of my study, showing that food insecurity usually occurs at the household level and is likely influenced by socioeconomic and demographic factors. These factors in turn may have nutritional, clinical, and behavioral implications that could influence health outcomes. Nutritional implications refer to the consumption of food that is nutritionally inadequate in both quality and quantity thereby provoking clinical issues. Clinical implications refer to different illnesses that are provoked or affected by nutritional issues. The clinical complications would in turn influence the adoption of certain behaviors to cope with food insecurity and managing illnesses. Causality could not be established in this study, but the results are consistent with the SEM and the proposed conceptual framework for food insecurity and the management of illness. For example, the results showed a possible association between food insecurity (nutritional implications) and management of illness (behavioral implications), where people who were food insecure were four times less likely to adhere to medication than those who were food secure. Results also showed a possible association between the use

of food assistance (food insecurity) and management of illness (behavioral implications), where people who used food assistance were more likely to skip medications that those who did not use food assistance programs.

Strengths and Limitations of the Study

A notable strength of this study is the fact that it was the first of its kind for Wayne County, Ohio. Furthermore, the results could be valuable to various organizations in terms of decisions and policies in Wayne County, Ohio. However, this study was not without limitations. The study suffered from non-response bias, evidenced by a sample size of 130 which was 22% of the proposed sample size of 583. Some participants reported that some of the questions were very personal and they felt embarrassed to answer them. For instance, some participants who refused to respond expressed embarrassment about sharing their use of food assistance programs for fear of being considered poor or living in poverty. Some participants also expressed fear of being scolded by their healthcare providers about skipping medication, and as such, did not complete the questionnaire. Another limitation of this study was the use of the short form of the Food Security Survey Module (FSSM). The FSSM assesses household-level food security instead of individual-level food security. Using a food security model that assesses household food security instead of individual food security could produce misleading results. Another limitation was that I conducted the study in the major cities of Wayne county rather than the entire county, which potentially limited the generalization of results. The study's cross-sectional design also was a limiting factor.

According to Sedgwick (2014), cross-sectional design studies could be susceptible to non-response bias, especially if the responses of those participants differ from those who do not participate in the study rendering it not representative of the population. Another limitation was that participants provided self-reported responses and limited the objectivity of measuring food insecurity. Despite these limitations, it must be noted that the information provided by this study could be of benefit to policymakers in Wayne County, Ohio.

Recommendations

Recommendations for future studies in Wayne County, Ohio include assessing the impact of food assistance programs on people who are food insecure and have various diseases, and also determine the impact of the use of food assistance on the way people manage their illnesses. More information is needed on food insecurity and its impact on the use of emergency medical services. Results from a survey of random adult patients showed that food insecurity was a significant predictor of the use of emergency services (Doran et al., 2017). Doran et al. (2017) highlight the scarcity of studies that examine the relationship between food insecurity and use of emergency services. Finally, I would recommend studies on the impact of kitchen gardening on food insecurity and use of food assistance.

Implications for Social Change

The results of this study suggest a need for social change at the individual, community, and healthcare levels so that low-income residents who experience food

insecurity could effectively manage their illness. At the individual and community levels, social change implications could include modification of health and nutrition education methods that would help those who are food insecure to make informed and healthful choices. Health and nutrition education programs could be conducted using various methods of communication (TV, radio, newspapers, cell phone apps) to provide simplified information to sensitize people to the importance of following a medicine regimen for optimal health outcomes. According to Lundeen et al., (2017), more research is needed to ascertain program effectiveness and provide pertinent information to potential stakeholders. Identifying the potential cost-effectiveness of the above suggestions could increase the likelihood of implementation.

Conclusions

This was the first study to examine the impact of food insecurity on the management of illness in Wayne County, Ohio. The hypothesized relationship between food insecurity and management of illness and the use of food assistance and adherence to medication were suggested by the findings of this study. However, additional research with an appropriate sample size is needed to validate these findings and to explore the relationship between food insecurity and the use of emergency services.

The results of this study suggest public health implications related to the food insecurity and the management of illness. It is imperative that action is taken to reduce food insecurity and improve adherence to medication among the residents in Wayne County, Ohio. The onus not only rests with the residents of Wayne County, Ohio, but

also with healthcare and policy makers who need to make and implement changes that will empower people and effect social change by reducing food insecurity and improving management of illness.

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Appendix A: Study Questionnaire

Zip Code:

Impact of Food Insecurity on the Management of Illness Questionnaire

Food Security Questions

These next questions are about the food eaten in your household in the last 30 days and whether you were able to afford the food you need.

During the last 30 days, how often was this statement true:

1. The food that we bought just didn't last, and we didn't have money to get more.

   1 Often 2 Sometimes 3 Never

During the last 30 days, how often was this statement true:

2. We couldn't afford to eat balanced meals.

   1 Often 2 Sometimes 3 Never

3. In the past 30 days, did you or other adults in your household ever cut the size of your meals because there wasn't enough money for food?

   1 Yes, on 3 or more days

   2 Yes, on 1 or 2 days

   3 No

4. In the past 30 days, did you or other adults in your household ever skip meals because there wasn't enough money for food?

   1 Yes, on 3 or more days

   2 Yes, on 1 or 2 days

   3 No

5. In the last 30 days, did you ever eat less than you felt you should because there wasn't enough money to buy food?

   1 Yes 2 No

6. In the last 30 days, were you ever hungry but didn't eat because you couldn't afford enough food?

1 Yes 2 No

7. During the last 30 days, how often was this statement true:

I used food from a Food Pantry or soup kitchen to supplement food at home.

1 Often 2 Sometimes 3 Never

8. Do you receive WIC, SNAP or any other Federal nutrition assistance?

1 Yes 2 No

Health & Medication Management Questions

9. Has a doctor, nurse, or other health professional EVER told you or anyone in the home that you had/have any of the following? CIRCLE ALL THAT APPLY

High blood pressure (Hypertension)	Heart attack (Myocardial Infarction)
Angina/coronary heart disease	Stroke
Arthritis, rheumatoid arthritis	Gout
Lupus	Fibromyalgia
Type I Diabetes	Type II Diabetes
Osteoporosis*	Obesity
Depression	ADD

Other_____

*Osteoporosis is a condition where bones become brittle and break (fracture) more easily. It is not the same condition as osteoarthritis, a joint disease.

10. How many different medications are currently prescribed for you?

None 1-2 3-4 5-6 7-10 11 or more

11. About how many different over-the-counter medications (OTC) (Examples: aspirin, Colace, ibuprofen) do you take every day?

12. Do you have any health insurance that helps pay for prescription medications (Examples: WellCare, AARP, Humana Gold Choice, Veteran's Tricare, Medicaid)?

    Yes No

13. Not counting the costs paid by your insurance, how much do your prescription medications cost you and your family each month? In other words, how much do you typically pay out-of-pocket per month for medications prescribed for you?

$0	$151 - $200 per month
$1 - $50 per month	$201 - $250 per month
$51 - $100 per month	$251 - $300 per month
$101 - $150 per month	Greater than $300 per month

Please read the following questions regarding your use of prescription medications. Mark the appropriate answer ('Yes' or 'No'). In the past 30 days ...

14. Have you ever skipped doses of a medicine because of the cost?

    Yes No

15. Have you ever taken a smaller dose of medicine than was prescribed by your doctor because of the cost (Example: cutting pills in half)?

    1 Yes 2 No

16. Have you ever delayed refills of prescriptions because of the cost?

    1 Yes 2 No

17. Have you ever stopped taking medicines because of the cost?

    1 Yes 2 No

18. Have you ever avoided new prescriptions because of the cost?

    1 Yes 2 No

19. Did you ever take less effective prescription medications than those initially prescribed by your doctor because of the cost?

    1 Yes 2 No

20. Did you ever switch to an over-the-counter alternative to a prescription medication because of the cost?

1 Yes 2 No

Please answer the following questions about how you obtained your prescription medications. Mark the appropriate answer ('Yes' or 'No'). In the past 30 days ...

21. Did you ever seek free samples of a prescription medication because of the cost?

1 Yes 2 No

22. Did you ever import a prescribed medication (order from another country) because of the cost?

1 Yes 2 No

23. Were you ever not able to purchase a prescribed medication because of the cost?

1 Yes 2 No

24. Have you ever had to choose between purchasing food or medications?

1 Yes 2 No

Demographics

25. What is your age? (Added)
26. What is your gender? (added)

Male Female Other_____

27. Including yourself, how many people live in your household?

a. 1 person
b. 2 people
c. 3 people
d. 4 people
e. 5 people
f. 6 people
g. 7 or more people

28. Thinking about the total combined income from all sources for all in this household, was your total household annual income during the year 2018 above or below $20,000.00?

Below $20,000.00 Above $20,000.00

Thank you for taking this survey!

Appendix B: IRB Approved Informed Consent Form

You are invited to take part in a voluntary research study about the Impact of Food Insecurity on the Management of Illness in in Wayne County, Ohio. The researcher is inviting participants between ages 18 and 65 years old experiencing food insecurity (not having enough food in the home to feed the whole family), who are single, married or divorced, who do or do not receive SNAP or WIC, employed or unemployed, and do or do not have health insurance. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

This study is being conducted by a researcher named Bernadette Paul who is a Ph.D. candidate at Walden University.

Background Information:

The purpose of this study is to understand how food insecurity (not having enough food in the home to feed the whole family) affects the way you take care of your illness. To find out if you are skipping or reducing medicine doses because of food insecurity.

Procedures:

If you agree to be in this study, you will be asked to:

Answer the 28 questions in the questionnaire and this should take approximately 1 hour. This information will be collected once. You will not be required to put any personal information such as names, date of birth, or addresses. You will be required to put your zip code. There will be no compensation for completing this survey.

Here are some sample questions:

The food that we bought just did not last, and we did not have money to get more. We could not afford to eat balanced meals. Yes No

In the past 30 days, did you or other adults in your household ever cut the size of your meals because there wasn't enough money for food? Yes No

Voluntary Nature of the Study:

This study is voluntary. You are free to accept or turn down the invitation. No one at this facility office will treat you differently if you decide not to be in the study. If you decide to be in the study now, you can still change your mind later. You may stop at any time.

Risks and Benefits of Being in the Study:

Being in this type of study involves very little risks. While being in this study would not pose a risk to your safety or wellbeing, you may become fatigued or emotional from answering the questions. Feel free to contact the Counseling Center of Wayne and Holms County (330 264 9029) if you become emotional and need to speak to someone. The information provided in the answers will not be shared. This study is partial fulfillment of my dissertation requirement. The results from this study will provide relevant information to the policy makers of the state and county to use in plans to reduce the devastating impact of food insecurity.

Privacy:

Reports coming out of this study will not share the identities of individual participants. You will be required to put your zip code. Details that might identify participants, such as the location of the study, also will not be shared. You will not be required to put any personal information such as names, date of birth, or addresses. Even the researcher will not know who you are. Data will be kept secure by data encryption, and the use of codes, and will be kept for a period of at least 5 years, as required by the university.

Contacts and Questions:

You may ask any questions you have now. Or if you have questions later, you may contact the researcher at 330-347-4288 and/or bpaul.665@gmail.com. If you want to talk privately about your rights as a participant, you can call the Research Participant Advocate at my university at 612-312-1210. Walden University's approval number for this study is 12-05-18-0251859 and it expires on December 4th, 2019.

Please keep this consent form for your records.

Obtaining Your Consent

If you feel you understand the study well enough to make a decision about it, please indicate your consent by returning a completed survey. To protect your privacy, no consent signature is requested.

2018.12.05

13:19:01

-06'00'

Appendix C: Original Questionnaire

Home-Delivered Meals Participant Survey

Health-Related Questions

1. Would you say that in general, your health is . . .

1 Excellent 2 Very Good3 Good

4 Fair

5 Poor

2. Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?

3. Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?

4. During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work or recreation?

During the past 6 months, about how many different times did you stay ...

5. In the hospital

overnight or longer? Never 1

1-2 times 2

3-4 times 3

5 or more times 4

6. In a rehabilitation or nursing facility (Example: for recovery after a surgery)?

1 2 3 4

7. During the past 6 months, about how many times did you see or talk to a medical doctor or assistant? (Do not count the doctors you saw while you were an overnight patient in a hospital or nursing home.)

1 Never 2 1-6 times 3 7-11 times 4 12 or more times

8. During the past 6 months, have you unintentionally lost 5 or more pounds?

1 Yes 2 No

9. How would you describe your appetite?

1 Excellent 2 Very Good 3 Good 4 Fair 5 Poor

10. Regarding your present social activities, do you feel you are doing about enough, too much, or would you like to be doing more?

1 About enough 2 Too much 3 Would like to be doing more

11. How often do you get the social and emotional support you need from family members, friends, neighbors, etc? Would you say ...

1 Always 2 Usually 3 Sometimes 4 Rarely 5 Never

12. In general, how satisfied are you with your life? Would you say ...

1 Very satisfied 2 Satisfied 3 Dissatisfied 4 Very dissatisfied

Food Security Questions

These next questions are about the food eaten in your household in the last 30 days and whether you were able to afford the food you need.

13. During the last 30 days, how often was this statement true:

The food that we bought just didn't last, and we didn't have money to get more.

1 Often 2 Sometimes 3 Never

14. During the last 30 days, how often was this statement true:

We couldn't afford to eat balanced meals.

1 Often 2 Sometimes 3 Never

15. In the past 30 days, did you or other adults in your household ever cut the size of your meals because there wasn't enough money for food?

1 Yes, on 3 or more days

2 Yes, on 1 or 2 days

3 No

16. In the past 30 days, did you or other adults in your household ever skip meals because there wasn't enough money for food?

1 Yes, on 3 or more days

2 Yes, on 1 or 2 days

3 No

17. In the last 30 days, did you ever eat less than you felt you should because there wasn't enough money to buy food?

1 Yes 2 No

18. In the last 30 days, were you ever hungry but didn't eat because you couldn't afford enough food?

1 Yes 2 No

Food & Nutrition Risk Questions

The following statements are about your nutritional health. Please mark your responses ('Yes' or 'No').

19. I have an illness or condition that made me change the kind and/or amount of food I eat.

1 Yes 2 No

20. I eat fewer than 2 meals per day.

1 Yes 2 No

21. I eat few fruits or vegetables.

1 Yes 2 No

22. I eat few dairy/milk products.

1 Yes 2 No

23. I have 3 or more drinks of beer, liquor, or wine almost every day.

1 Yes 2 No

24. I have tooth or mouth problems that make it hard for me to eat.

1 Yes 2 No

25. I don't always have enough money to buy the food I need.

1 Yes 2 No

26. I eat alone most of the time.

1 Yes 2 No

27. I take 3 or more prescribed or over-the-counter drugs a day.

1 Yes 2 No

28. Without meaning to, I have lost or gained 10 pounds in the last 6 months.

1 Yes 2 No

29. I am not always physically able to shop, cook, and/or feed myself.

1 Yes 2 No

30. Do you currently receive food stamps?

1 Yes 2 No

Please answer the following questions about all the food you usually eat each day:

***0 servings also includes less than daily. Example: once a week/month/once in a while.**

36. How many servings of fruit do you usually eat each day?

(1 serving = 1 medium piece of fruit; 1/2 cup chopped, cooked or canned fruit; 1/4 cup dried fruit; or 1/2 cup juice.)

1 0 servings 4 3 servings

2 1 serving 5 4 servings

3 2 servings 6 5 or more

37. When you eat the Home Delivered Meal, do you usually eat the fruit provided?

1 Yes 2 No

38. How many servings of potatoes do you usually eat each day?

(1 serving = 1 small baked potato; 1/2 cup mashed or boiled potatoes; 10 French fries; or 1/2 cup hash browns)

1 0 servings 4 3 servings

2 1 serving 5 4 or more servings

3 2 servings

39. When you eat the Home Delivered Meal, do you usually eat the potatoes provided?

1 Yes 2 No

40. Other than potatoes, how many servings of vegetables do you usually eat each day?

(1 serving = 1/2 cup cooked or chopped vegetables; 1 cup raw leafy vegetables; or 1/2 cup vegetable juice.)

1 0 servings 4 3 servings

2 1 serving 5 4 servings

3 2 servings 6 5 or more servings

41. When you eat the Home Delivered Meal, do you usually eat the vegetables provided?

1 Yes 2 No

42. How many servings of bread, cereal, rice, pasta, noodles, or tortillas do you usually eat each day?

(1 serving = 1 piece of bread or a tortilla; 1 cup cold cereal; 1/2 cup of hot cereal; or 1/2 cup rice, pasta, or noodles.)

1 0 servings 3 3-4 servings 5 6 or more servings

2 1-2 servings 4 5 servings

43. When you eat the Home Delivered Meal, do you usually eat the bread, cereal, rice, pasta, noodles, or tortillas provided?

1 Yes 2 No

44. How many servings of milk, cheese, or yogurt do you usually have each day?

(1 serving = 1 cup milk or yogurt; 1 ½ ounce natural cheese, such as cheddar; or 2 ounces processed cheese, such as American cheese.)

1 0 servings 3 2 servings

2 1 serving 4 3 or more servings

45. When you eat the Home Delivered Meal, do you usually eat the milk, cheese, or yogurt

provided?

1 Yes 2 No

46. How many servings of meat such as beef, pork, chicken, fish, cold cuts and eggs do you usually eat each day?

(1 serving = a 2-3 ounce chicken breast or fish fillet, hamburger patty, or 2 eggs.)

1 0 servings 3 2 servings 5 4 or more servings

2 1 serving 4 3 servings

47. When you eat the Home Delivered Meal, do you usually eat the meat, chicken, fish, and eggs

provided?

1 Yes 2 No

Food Acquisition Questions

Read each statement below and mark whether this statement is true 'Most of the time', 'Sometimes' or 'Almost never' on days when you receive Home Delivered Meals.

58. I cook for myself.

Most of the time 1

Sometimes 2

Almost never 3

The following is a list of services that may be offered through the Home Delivered Meals Program. Please mark:

'Yes' if you have received them 'No' if you have not received them

'NA' if the services are not available in your area

'Not Sure' if you are unsure whether or not you have received these services or if you are unsure if these services are available to you.

83. Case management (Help to set up and coordinate any of the services offered with the meals program in your area)

Yes 1

No 2

Not sure 3

NA

84. Legal help

1 2 3 NA

85. Nutrition counseling

1 2 3 NA

86. Transportation

1 2 3 NA

87. Help with shopping

1 2 3 NA

88. Help with personal care

1 2 3 NA

89. Help with housekeeping

1 2 3 NA

90. Help with cooking

1 2 3 NA

91. Help getting benefits like foods stamps and other public assistance

1 2 3 NA

92. Help paying for prescription

drugs Yes No Not sure NA

1 2 3 NA

93. Other, describe:

Health & Medication Management Questions

Has a doctor, nurse, or another health professional EVER told you that you had any of the following? Fill in the circle to answer 'Yes' or leave blank to answer 'No'.

94. High blood pressure (Hypertension)
Yes

1

95. Heart attack (Myocardial Infarction)
1

96. Angina/coronary heart disease
1

97. Stroke
1

98. Arthritis, rheumatoid arthritis, gout, lupus, fibromyalgia
1

99. Diabetes
1

100. Osteoporosis*
1

***Osteoporosis is a condition where bones become brittle and break (fracture) more easily. It is not the same condition as osteoarthritis, a joint disease.**

101. How many different medications are currently prescribed for you?

1 None 3 3-4 5 7-10

2 1-2 4 5-6 6 11 or more

102. About how many different over-the-counter medications (OTC) (Examples: aspirin, Colace, ibuprofen) do you take every day?

103. Do you have any health insurance that helps pay for prescription medications (Examples: WellCare, AARP, Humana Gold Choice, Veteran's Tricare, Medicaid)?

1 Yes 2 No

Please read the following questions regarding your use of prescription medications. Mark the appropriate answer ('Yes' or 'No'). In the past 30 days ...

105. Have you ever skipped doses of a medicine because of the cost?

1 Yes 2 No

106. Have you ever taken a smaller dose of medicine than was prescribed by your doctor because of the cost (Example: cutting pills in half)?

1 Yes 2 No

107. Have you ever delayed refills of prescriptions because of the cost?

1 Yes 2 No

108. Have you ever stopped taking medicines because of the cost?

1 Yes 2 No

109. Have you ever avoided new prescriptions because of the cost?

1 Yes 2 No

110. Did you ever take less effective prescription medications than those initially prescribed by your doctor because of the cost?

1 Yes 2 No

111. Did you ever switch to an over-the-counter alternative to a prescription medication because of the cost?

1 Yes 2 No

Please answer the following questions about how you obtained your prescription medications. Mark the appropriate answer ('Yes' or 'No'). In the past 30 days ...

112. Did you ever seek free samples of a prescription medication because of the cost?

1 Yes 2 No

113. Did you ever import a prescribed medication (order from another country) because of the cost?

1 Yes 2 No

114. Were you ever not able to purchase a prescribed medication because of the cost?

1 Yes 2 No

Please answer the following questions about how you obtained your prescription medications. Mark the appropriate answer ('Yes' or 'No'). In the past 30 days ...

115. Have you ever had to borrow money from a relative or friend outside your household to pay for medications?

1 Yes 2 No

116. Have you ever had to increase credit debt to pay for medications?

1 Yes 2 No

117. Have you ever spent less money on heat, electricity, clothing, household repairs, and appliances, or other basic needs so that you would have enough money to pay for your medications?

1 Yes 2 No

118. Have you ever had to choose between purchasing food or medications?

1 Yes 2 No

Demographics

119. What is your highest education level? Is it ...

1 Less than a high school diploma 3 Some college or an associate's 5 Some post-graduate work or

degree advanced degree

2 A high school diploma 4 A bachelor's degree

120. Including yourself, how many people live in your household?

1 1 person 3 3 people 5 5 people 7 7 or more people

2 2 people 4 4 people 6 6 people

121. Thinking about the total combined income from all sources for all persons in this household, was your total household annual income during the year 2007 above or below $20,000?

1 Below $20,000 2 Above $20,000

122. What is your total household monthly income?

Thank you for completing this survey!

Appendix D: Permission Emails

Bernadette Paul

From: Brown, Arvine <XXXXX@XXXXX.XXXX>
Sent: Wednesday, July 12, 2017, 1:22 PM
To: Bernadette Paul
Cc: JUNG SUN Lee
Subject: RE: Permission to use GEORGIA ADVANCED POMP-6 HDM PARTICIPANTS QUESTIONNAIRE

Hi Bernadette,

We don't have any objections to you using the questions, but it would be great if you would acknowledge and give credit to GA DHS/DAS and the UGA team who initially developed and conducted the questionnaires. Also if you were not aware we have published several papers based on longitudinal research using the instrument with our client population. I have copied Dr. Lee with the University of Georgia if you would like to speak directly with her in greater detail about the study. We wish you the best of luck with your own research.

Arvine Brown, MPA
Program Integrity Unit Manager
Division of Aging Services
Georgia Department of Human Services
2 Peachtree NW Suite 33
Atlanta, Georgia 30303
Email: XXXX@XXXX.XXXX
Office Phone: XXX-XXX-XXXX

From: Ocallaghan, Jean D.
Sent: Tuesday, July 11, 2017, 12:27 PM
To: Brown, Arvine <XXXX@xxx.xxx>; Fisher, Julia <XXX@XXX.XXX>
Subject: FW: Permission to use GEORGIA ADVANCED POMP-6 HDM PARTICIPANTS QUESTIONNAIRE

I also had a voicemail message from her – I don't think I'm knowledgeable enough to return her call – would this best be from Arvine or Julia?

Thanks.

From: Bernadette Paul [mailto:xxxx@xxxx.xxx]
Sent: Tuesday, July 11, 2017 10:54 AM
To: xxxx@xxxx.xxxx
Subject: Permission to use GEORGIA ADVANCED POMP-6 HDM PARTICIPANTS QUESTIONNAIRE

Dear Jean,

I am a Ph.D. candidate conducting research on food insecurity and its impact on disease management in Wayne County Ohio. I would like permission to use the questions from the "Health and Medication section of the "*Georgia Advanced Pomp-6 HDM Participants Questionnaire"* to conduct my research.

Grateful for your response,

Respectfully,
Bernadette Paul, MFCS-Food, and
Nutrition Ph.D. Public Health
Candidate at Walden University
xxxx@xxxxx.xxx
xxx-xxx-xxxx