Spring 5-10-2019

FAT FOR LIFE: THE DEVELOPMENT OF A LOW-CARBOHYDRATE HIGH-FAT DIETARY TOOLKIT FOR TYPE 2 DIABETES IN RURAL SOUTHEAST KANSAS

Curtis Beall
Pittsburg State University, cbeall@gus.pittstate.edu

FAT FOR LIFE: THE DEVELOPMENT OF A LOW-CARBOHYDRATE HIGH-FAT DIETARY TOOLKIT FOR TYPE 2 DIABETES IN RURAL SOUTHEAST KANSAS

A Scholarly Project Submitted to the Graduate School
In Partial Fulfillment of the Requirements
for the Degree of
Doctor of Nursing Practice

Curtis Beall, BSN, RN

Pittsburg State University

Pittsburg, Kansas

May 2019

FAT FOR LIFE: THE DEVELOPMENT OF A LOW-CARBOHYDRATE HIGH-FAT DIETARY TOOLKIT FOR TYPE 2 DIABETES IN RURAL SOUTHEAST KANSAS

Curtis Beall, BSN, RN

APPROVED:

DNP Scholarly Project Advisor_____
Dr. Trina Larery, School of Nursing

Committee Member_____
Dr. Amy Hite, School of Nursing

Committee Member_____
Dr. Janet Zepernick, Department of English and Modern Languages

Committee Member_____
Dr. Ashleigh Heter, School of Nursing

FAT FOR LIFE: THE DEVELOPMENT OF A LOW-CARBOHYDRATE HIGH-FAT DIETARY TOOLKIT FOR TYPE 2 DIABETES IN RURAL SOUTHEAST KANSAS

An Abstract of the Scholarly Project by
Curtis Beall, BSN, RN

The purpose of this project was to identify the feasibility of a low-carbohydrate high-fat (LCHF) diet in less affluent type 2 diabetics in rural Southeast Kansas, specifically, Crawford County. The author assessed this through the identification of the resources offered in Crawford County, and ultimately, the development of an LCHF dietary toolkit utilizing these resources. The toolkit offers an array of LCHF resources including compliant foods, grocery prices, shopping lists, phone applications, books, internet websites and blogs, accountability forums, and fitness centers. Upon completion of the dietary toolkit a select few healthcare providers directly involved with diabetes in Crawford County were sought out for feedback. Findings from the LCHF dietary toolkit development indicated an LCHF diet for less affluent type 2 diabetics is feasible from a financial and resource standpoint. The feedback received from providers was also positive. While more research is recommended on long-term adherence, the toolkit offers a great starting foundation for implementing an LCHF diet.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

Introduction

"Let food be thy medicine and medicine be thy food." – Hippocrates

Type 2 diabetes is a serious health concern. According to the World Health Organization (WHO) the number of individuals with diabetes worldwide has risen from 108 million in 1980 to 422 million in 2014 (WHO, 2017). In 2015, 9.4% of the United States population had diabetes, while nearly 34% had prediabetes (Center for Disease Control [CDC], 2017). Additionally, type 2 diabetes accounts for 90% to 95% of all diabetic cases.

The consequences of diabetes are significant. The global financial cost of diabetes is estimated to be $1.29 trillion per year, or roughly 2% of the global gross domestic product (Bommer et al., 2017). In the United States (U.S.) alone the cost of managing diabetes has risen from $245 billion in 2012 to $327 billion in 2017 (American Diabetes Association [ADA], 2018). To put this number into perspective, the entire annual budget for the National Aeronautics and Space Administration (NASA) in 2017 was $19 billion (NASA, 2017). Less than one tenth the annual cost of treating diabetes.

Description of the Clinical Problem

Experts agree that diabetes is not only manageable, but also preventable with the proper education, nutrition plan, and exercise regimen. Yet, the number of individuals

with diabetes continues to climb. Therefore, education, nutrition plans, or exercise regimens are not being prescribed, lack efficacy, or simply aren't being followed.

While views continue to differ on the best diet for diabetic and prediabetic patients, it seems fair to suggest other dietary options for the patient to incorporate into their lives. One such diet that has shown promise in combating diabetes is a low-carbohydrate, high-fat (LCHF) diet. Providing this additional diet option for the patient may prove to increase motivation and improve compliance. All individuals are unique and the treatment approach for diabetes and prediabetes should reflect that.

After discussion with a certified diabetic educator at Community Health Center of Southeast Kansas (CHCSEK), the central theme that emerged was a lack of resources available to type 2 diabetes patients in rural SEK. This has led to failed attempts at multiple dietary programs by CHCSEK, the most recent being a dietary program with a 94% dropout rate (N. Evans, personal communication, October 23, 2018). An analysis of the resources available in SEK, coupled with an all-encompassing dietary toolkit utilizing the resources found, could go a long way in combatting type 2 diabetes in this setting. With the current encouraging data on LCHF diets, and its lack of utilization to manage type 2 diabetes thus far in rural SEK, it may serve as a good dietary template to utilize.

Economic Burdon of Diabetes.

The economic burden diabetes places on America is staggering. As previously discussed, the annual estimated costs of diabetes in America is $327 billion (ADA, 2018). Unfortunately, that is the just the tip of the iceberg. Individuals with diabetes have annual medical costs of $16,752, of which $9,601 is attributed to diabetes (ADA, 2018). Simply having diabetes, increases one's medical costs by 2.3 times, and accounts for 1 in every 4

healthcare dollars in the United States (ADA, 2018). Hospital inpatient care accounts for 30% of the medical cost, prescription medications for complications of diabetes another 30%, antidiabetic agents and diabetes equipment and supplies 15%, and finally physician office visits 13% (ADA, 2018).

Lifetime costs of type 2 diabetes have also been examined and add to the financial concern. The overall average lifetime medical cost for treating type 2 diabetes is $85,200, with men diagnosed between the ages of 25 and 44 having the highest lifetime direct medical cost at nearly $125,000 (Zhuo, Zhang, & Hoerger, 2013). One area that largely contributes to this cost, is the monthly expense for diabetes medications. Within the last ten years alone insulin has more than tripled to a staggering $400-$500 a month (Spero, 2016). Other avenues of managing type 2 diabetes need to be considered in order to overcome these high costs, especially amongst less affluent populations.

Significance

The burden of type 2 diabetes is not limited to economics. By 2030, type 2 diabetes is expected to become the 7th leading cause of death in the world (Jelinek et al., 2017). Type 2 diabetes is associated with multiple comorbidities. Nearly all adults with diabetes have at least one other accompanying comorbidity, with about 40% having more than two (Lin, Kent, Winn, Cohen, & Neumann, 2015). Diabetes increases the risk of heart disease related deaths in adults by fourfold, with 68% of diabetic adults over 65 years old dying from heart disease (American Heart Association [AHA], 2017). Diabetes and the resulting comorbidities ultimately lead to premature death. In fact, on average the life expectancy of an individual with type 2 diabetes is cut short by 10 years (Diabetes UK, n.d). However, despite the well-documented health risks of type 2 diabetes, the

significant increase in type 2 diabetes diagnoses over the last 30 years suggests a lack of urgency in both the medical community and the population at large.

Demographic of Southeast Kansas

Crawford County, Kansas, located in Southeast Kansas, has an estimated population of 39,034 (United States Census Bureau, 2017). There is a lack of racial and ethnic diversity with over 90% of the population White. Educationally, Crawford County has disparities. While 90% of the population has graduated high school, only a fourth have obtained a bachelor's degree or higher. Financial inequalities also exist. In fact, Crawford County is the poorest county in all of Kansas, with a mean household income of $37,607 (Comen, 2018). This is nearly $15,000 less than the state average of $53,571 (Comen, 2018). Furthermore, close to 22% of the population is in poverty (United States Census Bureau, 2017).

There are 105 counties in the state of Kansas. In looking at the 103 counties considered, Crawford County ranks near the bottom in both health behaviors (92) and quality of life (96) (Crawford, 2017). Interestingly, Crawford County ranks 29th in clinical care, suggesting the care is being provided, yet the health outcomes remain poor.

Specific Aim/ Purpose

The specific aim of this project was to develop an all-encompassing LCHF dietary toolkit to assess the feasibility of not only developing, but incorporating, a LCHF dietary toolkit for type 2 diabetic patients, in rural healthcare clinics, in Southeast Kansas (SEK). A goal of the project was to identify what resources were needed to ensure successful implementation of a LCHF diet in a non-affluent rural population, while also providing education to providers. As evidence continues to emerge on the LCHF diet, it is

important that patients and healthcare providers are not only fully educated on the diet but also given the proper resources to have success implementing it. Upon development of the LCHF dietary toolkit it was presented to local healthcare providers for feedback. If the dietary toolkit is found to have success in the community, submission as a grant proposal could be considered.

Theoretical Framework

Two theoretical frameworks were found to be directly in alignment with the project. The Health Belief Model (HBM) and Milios Framework for Prevention will serve as the basis for this project. The HBM, first developed in the 1950s by Godfrey Hochbaum, Irwin Rosenstock, and Stephen Kegels, seeks to explain and predict healthy behaviors (University of Twente, 2017). The model makes the assumption that a person will take health- related actions if they feel that:

1. a negative health condition can be avoided,
2. has a positive expectation that by taking a recommended action they will avoid a negative health condition, and
3. believes that he/she can successfully take the recommended health action (University of Twente, 2017).

This directly aligns with this projects assumption that a person will utilize a LCHF diet in order to avoid the negative health consequences of type 2 diabetes. Additionally, the dietary toolkit will be designed in such a way that individuals will feel confident they can successfully implement a LCHF diet with the resources provided.

Milio's Framework for Prevention, developed in 1976 by Nancy Milio, makes the presumption that behaviors are a result of limited choices available to a

population, largely due to organizational decisions (Milio, 1976). Milio advocates for the broadening of options available to a population, while also making health promoting choices easier to obtain. This is exactly what the development of an LCHF dietary toolkit set out to do. Not only does it broaden the dietary options available to type 2 diabetics but will help ease adherence to an LCHF diet.

Project Questions

- What does an LCHF dietary toolkit look like to ensure successful implementation by non- affluent type 2 diabetics in rural Southeast Kansas?
- Is an LCHF diet a feasible option for rural clinics in Southeast Kansas for successful management of type 2 diabetes?

Definition of Key Terms

The following definitions are provided to assist with clarification throughout the project.

- Low-carbohydrate, high-fat (LCHF) diet: A diet consisting of 65% fat, 20% protein, and 15% carbohydrates (Paleo Leap, n.d.)
- Ketosis: A metabolic process in which the body is depleted of glucose, and thus uses fat instead of glucose for energy (Mcintosh, 2017).
- Ketogenic Diet: A diet typically consisting of 75% or more fat, 20% or less protein, and 5% carbohydrates in order to induce ketosis (Mcintosh, 2017).
- Type 2 Diabetes: A form of diabetes in which the body is unable to use insulin properly and also unable to compensate for increased insulin in the body leading to hyperglycemia (Merriam-Webster, n.d.).

- Self-Management: Management of one's own care or well-being (Merriam-Webster, n.d.).
- Adherence: Steady of faithful attachment (Merriam-Webster, n.d.).
- Affluent: Having an abundance of goods or riches (Merriam-Webster, n.d.).

Logic Model of the Proposed DNP Project

A logic model helps show the relationship between inputs and the resources needed in order to ultimately achieve the outcomes sought. The outcomes for this project were divided into short, intermediate, and long term. In the short term, the main outcome was centered on the development of a LCHF dietary toolkit and its feasibility in rural SEK. The intermediate outcomes included presenting the findings to rural healthcare providers and increased adherence of a LCHF diet for type 2 diabetes patients. Long term outcomes will focus on utilization of the LCHF diet by providers and patients as means to combat type 2 diabetes in rural SEK. Future outcomes could include the development of a grant proposal to help with financial constraints that may hinder implementation of the diet.

Assumptions made in the model include:

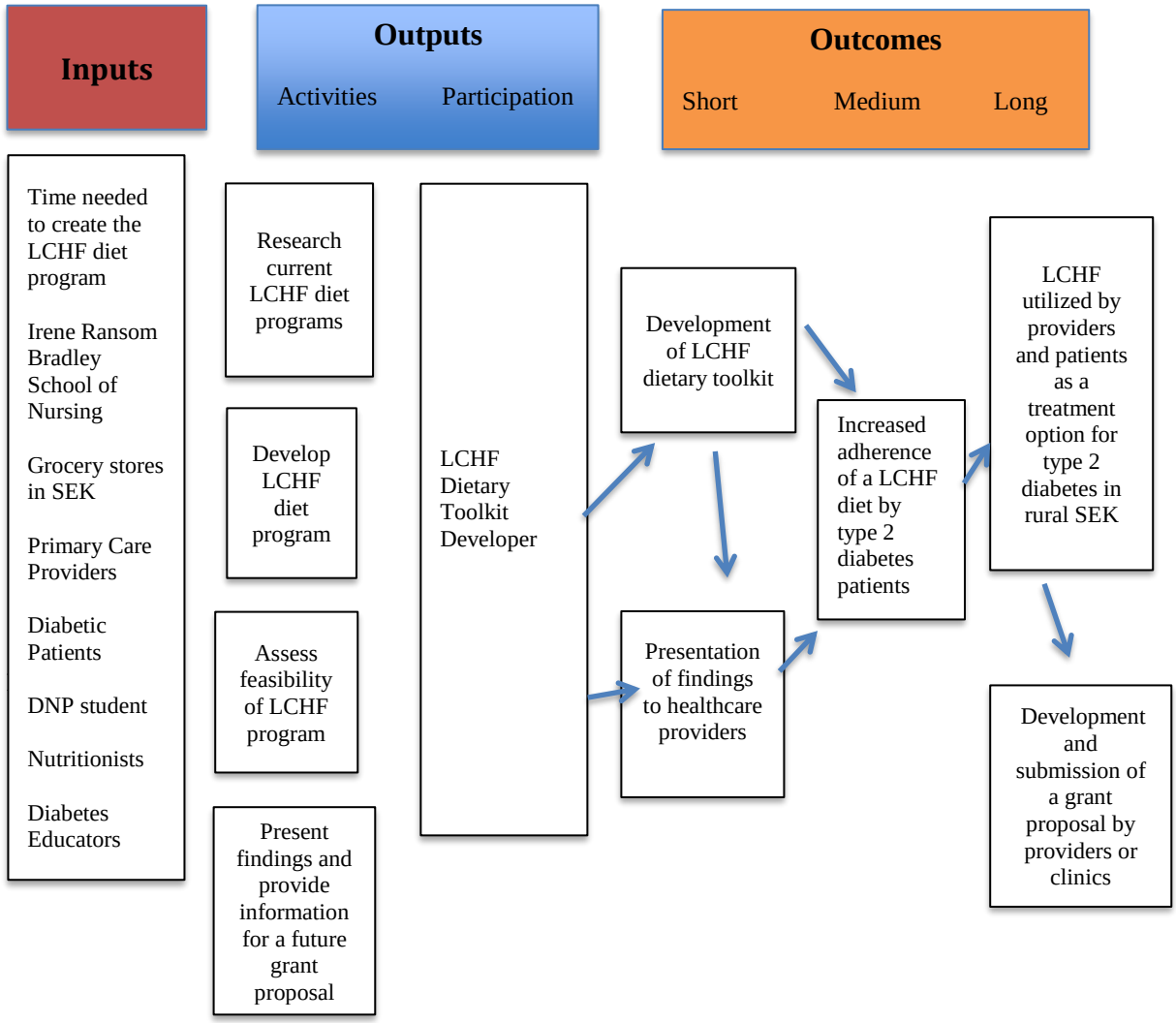
- Providers have a general knowledge of managing diabetes
- Patients with type 2 diabetes are motivated to improve their disease outcomes and are open to trying a LCHF diet
- A current LCHF diet program doesn't exist in rural Southeast Kansas
- Approval will be granted by Pittsburg State University and the Irene Ransom Bradley School of Nursing and the IRB Board.

External barriers and limitations include:

- Lack of feasibility of a LCHF diet in rural SEK.
- Lack of feedback from providers

Project: LCHF Diet for Diabetes Management Logic Model

Goal: Develop a LCHF dietary toolkit that is feasible for less affluent type 2 diabetics in rural clinics in SEK



Assumptions
Providers have a general knowledge of managing type 2 diabetes
Patients with type 2 diabetes are motivated to improve their disease outcomes and are open to trying a LCHF diet
A current LCHF diet program doesn't exist in rural Southeast Kansas
Approval granted by PSU SON

External Factors
Lack of feasibility of a LCHF diet in rural SEK due to lack of resources available
Lack of feedback from providers

Figure 1- LCHF Diet Logic Model

Summary

The continuous rise of diabetes globally is alarming. If the current trend continues nearly 750 million individuals will have diabetes by 2040, and this doesn't even take into account the number of prediabetics (WHO, 2017). More time and resources need to be put towards the prevention of diabetes, especially in the primary care setting. While providers certainly need to be looking for trends in patients' weight, fasting glucose, and hemoglobin A1c levels over the years, patients need to take initiative in their health as well. One way to take control of one's health is through changes in diet. While adopting an LCHF diet has proved to be effective in managing diabetes, a blueprint entailing how to implement such a diet in rural communities was lacking. An all-encompassing LCHF dietary toolkit was a potential solution to this problem. The toolkit includes several resources to ensure ease of implementation for type 2 diabetic patients in rural Southeast Kansas. Upon completion of the toolkit it was presented to a select group of healthcare providers across SEK with feedback given.

CHAPTER II

Integrated Review of Literature

A review of the literature was performed through the search of multiple online databases including Current Index to Nursing and Allied Health Literature (CINAHL) and PubMed of the National Library of Medicine. Through the review a significant number of articles were identified related to low- carbohydrate, high fat (LCHF) diets and the potential benefits of such a diet for individuals with type 2 diabetes. Additionally, literature on the overall ability of individuals to adhere to a specific diet was examined. Search phrases used to retrieve the articles included "type 2 diabetes and diet," "low carbohydrate high fat diet and type 2 diabetes," "ketogenic diet and type 2 diabetes," "adherence to a diet," and "feasibility of the ketogenic diet." Additionally, current standards of medical care for diabetes from the American Diabetes Association were utilized. Organizational websites including the World Health Organization, American Diabetes Association, and Center for Disease Control and Prevention were utilized to identify current statistics on diabetes.

Literature Review

Low-Carbohydrate, High-Fat Diet. Studies of the effectiveness of LCHF diet protocols typically restrict carbohydrates to less than 50 grams per day (Phinney, n.d.). At the cellular level, a LCHF diet works by depleting the carbohydrate stores in the body. In

the absence of carbohydrates, insulin is reduced, and thus a reduction in lipogenesis and fat accumulation ensues (Paoli, Rubini, Volek, & Grimaldi, 2013). In just a few days of following a low-carbohydrate diet the glucose reserves in the body become insufficient to support the central nervous system, and consequently an increase in ketone bodies, which are ultimately used by the tissues as a source of energy (Paoli, Rubini, Volek, & Grimaldi, 2013). This process is known as ketogenesis. It should be made clear that dietary ketosis is not the same as diabetic ketoacidosis, a serious condition that develops in poorly controlled diabetics where ketone bodies in the blood reach 20 mmol/l. Dietary ketosis produces ketone levels of 7 to 8 mmol/l (Gildea, 2017).

Regarding cardiovascular risk factors, studies have shown a decrease in systolic and diastolic blood pressure, an increase in high-density lipoprotein (HDL-C), and a decrease in low-density lipoprotein (LDL-C) in patients who employ an LCHF diet (Hu & Bazzano, 2014). In a study by Bazzano et al. (2014) an LCHF diet was associated with a statistically significant increase in weight loss, and decrease in waist circumference, compared to a low-fat diet after 3, 6, and 12 months of following the protocol.

Type 2 Diabetes and Low-Carbohydrate, High-Fat Diet. LCHF diet as a treatment for diabetes dates back to the early 1900's. Prior to the discovery of insulin, LCHF diet was one of the most common treatments prescribed to diabetic patients (Westman, Yancy, & Humphreys, 2006). Despite the early success of LCHF diets in treating diabetes, the recommendation of the diet as a treatment option for diabetes has become controversial. This is unfortunate, as studies have continued to show the diet's effectiveness, and there are few risks associated with LCHF diets.

LCHF diet as a treatment for type 2 diabetes is effective in that it not only reduces the intake of foods that raise blood sugar levels, but also promotes weight loss (Moore & Westman, 2014). Additionally, emerging research indicates that an LCHF diet is equal to, if not more effective than the gold standard treatments, including medication, at managing type 2 diabetes (Moore & Westman, 2014). Although more research is needed in this area, these are potential groundbreaking findings and should continue to be examined. Despite the need for more research on an LCHF diet, and its effectiveness over diabetes medication, quality studies do exist that help illustrate the benefits of an LCHF diet over the more common recommended diets.

One such study conducted by Saslow et al. (2014) found that, compared to a moderate- carbohydrate, low-fat diet, a low-carbohydrate, high-fat diet consisting of 20-50 grams of carbohydrates a day was more successful at lowering Hemoglobin A1c (HbA1c) levels and decreasing total medication needs over a three-month period. Additionally, the study found statistically significant improvement in the diabetic patient's moods when on a low-carbohydrate, high-fat diet (Saslow et al., 2014). The authors attributed this improvement in mood to blood sugars being at a steady level over time.

In a similar study comparing high-carbohydrate (HC) diets to low-carbohydrate (LC) diets, LC diets outperformed HC diets in the treatment of type 2 diabetes, with patients showing greater improvements in blood glucose stability and decreases in medication requirements (Tay et al., 2015). Additionally, findings from this randomized controlled trial echoed those from previous findings, showing that LC diets in patients with type 2 diabetes increase HDL-C, while decreasing triglycerides and LDL-C levels

compared to HC diets (Tay et al., 2015). This is an important finding in that premature deaths in diabetic patients are often due to cardiovascular complications.

Most recent, and perhaps most impressive, is a study by Mckenzie et al. (2017), that analyzed the effects of a LC diet on diabetic adults between 21 and 65 years of age. A total of 238 diabetic adults completed the ten-week study, in which they with significant findings obtained. Prior to the intervention more than 80% of participants had HbA1c levels greater than 6.5%, and nearly 90% were taking at least one medication for diabetes. After ten weeks on a LC diet the mean HbA1c level decreased to 5.5% (Mckenzie et al., 2017). Additionally, 56% of the participants achieved an HbA1c level of less than 6.5%, 42.7% were able to decrease their medications, and 8% completely eliminated their medications (Mckenzie et al., 2017).

Despite the overwhelming body of evidence on the benefits of LCHF diets in treating diabetes, it continues to be overlooked. The findings from these studies not only help solidify the fact that an LCHF diet is an effective means of managing diabetes, but also demonstrate that it is an effective diet to combat the comorbidities associated with diabetes.

The Importance of Self- Management of Type 2 Diabetes. The benefits of effective self-management of diabetes are clear. Proper diabetes self-management has been shown to decrease hospital admissions and readmissions, which in turn decreases healthcare costs (Powers et al., 2017). Additionally, the effectiveness of patients' self-management of diabetes has a direct effect on glycemic control. In a study that followed 222 participants over four months, Gao et al. (2013) found that only 52% of participants achieved the HbA1c target of less than 6.5%.

Self-managing diabetes comes in the form of diet, exercise, glucose monitoring, and medication adherence, all of which require both proper education and patient buy-in. It is the patient who ultimately must maintain their chosen lifestyle and take their medication. Therefore, patients need to be involved in the decision-making process. The patient should also be given options with their care as each patient has their own unique health beliefs, cultural needs, family support, and financial status (Powers et al., 2017).

Adherence to an LCHF Diet. While there is clear data suggesting that LCHF diet is beneficial in type 2 diabetic patients, this diet serves little purpose if patients are unable to adhere to it. A cross sectional study by McPhee, Zinn, and Smith (2018) found that four factors were largely responsible in promoting adherence to a LCHF diet: Support from family and peers, need to be prepared, feeling of satiety, and the attitude toward the types of food being recommended.

Additionally, when considering adherence, it is important to be aware of the initial side effects associated with a LCHF diet. Nutritionist O'Byrne (n.d) notes the importance of accepting that the first few days of a LCHF diet will come with strong sugar and carbohydrate cravings. Other common symptoms associated with the initial implementation phase of a LCHF diet include headache, fatigue, and weakness (Mayo Clinic, 2017). Fortunately, strategies exist to overcome these initial symptoms of sugar and carbohydrate withdrawal. These strategies include increasing the consumption of water, dietary fat, and salt. Adding just a half teaspoon of salt to one's water may eliminate the side effects in as little as 15 to 30 minutes (Eenfeldt, 2018). Simply being aware of these common side effects up front will eliminate scares or surprises associated with the diet should ultimately improve adherence.

Other strategies that have been reported in improving adherence include inducing ketosis, tailoring to the dietary preferences of the individual, and self-monitoring of food intake (Gibson & Sainsbury, 2017). Findings have shown that when an individual is in ketosis they are less hungry and exhibit greater fullness. This would appear to be advantageous when considering a LCHF diet that restricts carbohydrates, a macronutrient that is abundant in the standard American diet.

The literature clearly shows that in order to promote adherence to a LCHF diet family support, education and preparedness of the diet, feeling of fullness, self-monitoring of food intake, and awareness of initial side effects of the diet must be considered.

Successful LCHF Dietary Programs. Looking at successes of current LCHF dietary programs across the country, not only offers a blueprint, but also helps affirm an LCHF diet as a conceivable option for type 2 diabetes. The current leader in the field would appear to be Virta Health, who markets themselves as the "first clinically- proven treatment to safely and sustainably reverse type 2 diabetes" (Virta, 2018). Their results speak for themselves. To date, 87% of insulin users reduced or eliminated their usage after 10 weeks, 60% of patients reversed their type 2 diabetes after a year, and they have seen an average HbA1c reduction of 1% after 10 weeks (Virta, 2018). Their retention rates may be more impressive. In their most recent clinical trial Virta Health had a 92% retention rate after 10 weeks and 86% after 6 months (Virta, 2018).

Unfortunately, the cost for Virta almost surely eliminates it as an option for less affluent individuals, the likes of which are targeted in this quality improvement project. Virta charges a $500 initiation fee followed by $370 a month for the first year (Virta,

2018). However, Virta does offer an illustration of what their program looks like, which may help in the development of a similar, more cost effective, program. This includes continuous physician supervision, personalized dietary guidelines and health coaching, supplies needed (scale, glucose meter, ketone strips, lancets, and food diary), phone application for tracking healthcare data, and a private patient community for support and tips (Virta, 2018).

Another LCHF dietary program that has shown promise is HEALcare. The HEAL medical, team composed of Dr. Eric Westman and registered nurse Jacqueline Eberstein, have successful treated over 64,000 patients with their LCHF "keto treatment" (HEALclinics, 2018). They acknowledge that adhering to their LCHF protocol almost always eliminates the need for medications and insulin. In fact, they report remission from type 2 diabetes within 7 weeks without medications (HEALclinic, 2018). The program begins with an initial health assessment followed by a comprehensive tailored plan that involves a ketogenic diet, behavioral coaching and support, and medical supervision if deemed necessary. While cost is less than Virta, it still has monthly costs of no less than $75 a month (HEALclinic, 2018).

Standards of Care. "*Lifestyle Management: Standards of Medical Care in Diabetes- 2018*" by the American Diabetes Association (2018) includes current clinical practice recommendations for lifestyle management of diabetes. These recommendations were written by the members of the ADA Professional Practice Committee, a multidisciplinary expert committee, who update the recommendations annually or more frequently if needed. The recommendations for lifestyle management are broken down into sections that include: diabetes self- management education and support (DSMES),

medical nutrition therapy (MNT), physical activity, smoking cessation counseling, and psychosocial care. The tool used to evaluate the recommendations was the AGREE II instrument (AGREE Next Steps Consortium, 2013). The Grading of Recommendations Assessment, Development and Evaluation (GRADE) rating system was also utilized.

A total of 35 clinical practice recommendations were included on lifestyle management. Through the evaluation it was noted that the evidence was moderately high and the strength of recommendation strong. Out of the 35 practice recommendations 6 were selected for use within the project. Recommendations centered on smoking cessation and physical activity were not compatible with this project and thus excluded. The recommendations that were included were done so based on the literature review and research on patient management and nutritional recommendations for type 2 diabetic patients.

Practice Change Recommendation for Implementation. Lifestyle management for diabetes contain a total of six topics and 35 practice recommendations. A total of six specific recommendations were selected for implementation (Table 1). The two categories of recommendations included self-management and nutrition.

Table 1:

Summary of Lifestyle Management for Diabetes Patients

Self-Management	1. In accordance with the national standards for diabetes self-management education and support, all people with diabetes should participate in diabetes self-management education to facilitate the knowledge, skills, and ability necessary for diabetes self-care and in diabetes self-management support to assist with implementing and sustaining skills and behaviors needed

	for ongoing self-management (Strength of Recommendation- Strong). 2. Effective diabetes self-management education and support should be patient centered, may be given in group or individual settings or using technology, and should help guide clinical decisions (Strength of Recommendation- Strong)
Nutrition	1. There is no single ideal dietary distribution of calories among carbohydrates, fats, and proteins for people with diabetes; therefore, macronutrient distribution should be individualized while keeping total calorie and metabolic goals in mind (Strength of Recommendation- Strong) 2. A variety of eating patterns are acceptable for the management of type 2 diabetes and prediabetes (Strength of Recommendation- Strong) 3. People with diabetes and those at risk should avoid sugar-sweetened beverages in order to control weight and reduce their risk for CVD and fatty liver B and should minimize the consumption of foods with added sugar that have the capacity to displace healthier, more nutrient-dense food choices (Strength of Recommendation- Strong) 4. Data on the ideal total dietary fat content for people with diabetes are inconclusive, so an eating plan emphasizing element of a Mediterranean-style diet rich in monounsaturated and polyunsaturated fats may be considered to improve glucose metabolism and lower CVD risk and can be an effective alternative to a diet low in total fat but relatively

	high in carbohydrates (Strength of Recommendation- Strong).

Reproduced from American Diabetes Association, January 2018,p.S38-S50

Summary

A thorough literature review was conducted on type 2 diabetes, a LCHF diet, financial burden of type 2 diabetes, successful LCHF dietary programs in existence, and patient's ability to adhere to a LCHF diet. While the findings from the literature help validate the success of LCHF diets in managing diabetes, few have examined the feasibility of a LCHF diet for type 2 diabetes in rural communities. Prior to deciding if a LCHF diet is a viable option for managing type 2 diabetes in rural communities, it is important to determine the feasibility of the diet, given the resources, or lack thereof, available to type 2 diabetics in these settings. Additionally, with the emergence of more research on LCHF diets it is important for providers to stay informed on the most recent findings. The statistics on diabetes are too alarming to stay stagnant in the current ways of thinking. While a diet low in carbohydrates and high in fat may be counterintuitive to

what many providers and patients have been taught, the findings in the literature support the health benefits.

The management of type 2 diabetes in the primary care setting requires a partnership between patient and provider. If a LCHF diet is a feasible option for type 2 diabetes in rural SEK, it should be given consideration by providers. If the findings indicate a lack of feasibility of a LCHF diet in rural SEK, other lifestyle modifications will need to be considered. While medication is important, it should never be the sole treatment. Diet and exercise should always be encouraged. Chapter III will focus on the methodology of the development of the dietary toolkit.

CHAPTER III

Methods

Project Design

The design of the project was the development of an LCHF dietary toolkit for type 2 diabetic patients and healthcare providers in rural clinics in Southeast Kansas. The author examined every outlet available within the community prior to development of the educational toolkit. This section describes the design for the toolkit from start to finish. The project focused on the following research questions:

1. What does an LCHF dietary toolkit look like to ensure successful implementation by type 2 diabetics in rural Southeast Kansas?
2. Is an LCHF diet a feasible option for rural clinics in Southeast Kansas to successfully manage type 2 diabetes?

LCHF Dietary Toolkit

Many factors were considered when developing the LCHF dietary toolkit from start to finish. First, the setting and target population for the dietary toolkit were identified. Upon identification, every avenue that provides groceries for this population was explored. Cost of the groceries, food selections offered, and the layout of the food selections in each grocer was sought. Next, the gathering of LCHF educational resources was conducted. This came from online websites, online discussion boards, LCHF dietary

books, and LCHF dietary cookbooks. Other area resources that were examined included fitness facilities, and public events available to the population in this setting, such as cooking and exercise classes. Additionally, the different phone applications designed to facilitate a LCHF diet were explored. Finally, after taking all the information gathered, a community-based toolkit designed to serve type 2 diabetes in SEK was developed.

Setting

The development of the LCHF dietary toolkit was for Crawford County, a rural county in Kansas with a population of 39,000. This is an area of low population density and relatively high rates of poverty. It is also one of lowest ranked counties for health outcomes in the state of Kansas.

Target Population

The target population for the dietary toolkit was type 2 diabetes patients within Crawford County, Kansas, many of whom face significant financial constraints, as previously discussed. This population was chosen in large part due to these constraints and the lack of resources readily available to them. Additionally, healthcare providers caring for type 2 diabetes patients in rural SEK were targeted for feedback on the dietary toolkit.

Procedure

LCHF Toolkit Development. Following approval from the Irene Ransom Bradley School of Nursing Institutional Review Board Committee development of the LCHF dietary toolkit began. Researching current dietary programs that have had success guided the development of the tool. Discussions with healthcare providers at local healthcare clinics in Southeast Kansas was pursued to determine current successes and

shortcomings of diabetes treatment in the area. Additionally, the research included searching online discussion forums through diet and fitness sites such as MyFitnessPal and LIVESTRONG to gather user-supplied information about the obstacles encountered during transition to an LCHF diet and the strategies employed by individuals who were successful in making that transition. Books for the general public about implementing an LCHF diet were also utilized in designing the toolkit.

Due to the financial restraints on the target population, grocery costs for maintaining a LCHF diet were determined at area grocery stores in Southeast Kansas. Additionally, the ease of navigating the area grocery stores for LCHF diet foods was needed to be known. In order to establish this, visits were made, and costs assessed, at the local grocery stores. After all the research was completed, final design of the LCHF dietary tool was decided on and developed.

Since cues for food consumption and the types of food consumed often have social and/or emotional rather than purely physiological origins, this project researched strategies for altering behaviors related to food consumption. This is especially important in dealing with a population for whom limited financial resources means limited experience with replacing foods that give enjoyment or emotional satisfaction with other non-food substitutes.

IRB (Institutional Review Board) Approval. This scholarly project is the development of a dietary educational toolkit. No human testing will be conducted, nor will human subjects be involved; therefore, obtaining IRB approval was not necessary. That being said, prior to the development of the dietary toolkit, approval was sought from

members of the Pittsburg State University Irene Ransom Bradley School of Nursing DNP Scholarly Project Committee.

Timeline of Project Phases. The development of the LCHF dietary toolkit began in December 2018. Research and data were collected from local grocery stores, local fitness centers, online discussion boards, and other literature from December 2018 through January 2019. Completion of the dietary toolkit occurred in February 2019, with the presentation of the toolkit to local diabetes healthcare providers following shortly thereafter. Feedback was received and final edits to the project were completed in March 2019.

Resources Needed. A number of resources will need to be considered when developing the LCHF dietary toolkit. From a financial standpoint cost to develop the actual toolkit will be minimal. The only foreseeable cost will be the fuel used for transportation throughout the community visiting groceries stores and healthcare clinics. Personnel wise, the author will also look to their scholarly project committee for continual guidance. Additionally, the feedback from the local diabetes educators, dieticians, and healthcare providers will guide the author in determining local successes and failures of current diabetes treatment. A laptop and internet connection will also be needed for accessing websites and discussion boards to analyze facilitators and barriers of a LCHF diet from the patient perspective.

Market Analysis. Currently no such dietary toolkit exists in Southeast Kansas. The toolkit could show the feasibility of implementing a LCHF diet for type 2 diabetic patients in rural southeast Kansas. If the toolkit were to reveal the feasibility of such a diet it could be marketed as a beneficial option for type 2 diabetes patients in the

community. Looking specifically at clinics whose target patient population lacks financial resources, a dietary toolkit could help to greatly cut down on the costs of diabetes care. This could also extend nationwide, as the financial burden diabetes places on the country has already been discussed. Investing money in more affordable dietary programs, with proven results and multiple health benefits, rather than expensive medications aimed at one aspect of a disease, seems like a more financially responsible option.

Plan for Sustainability

The sustainability of an LCHF diet will be dependent on multiple factors. These factors include cost, ease of implementation, available food selection, overcoming symptoms associated with carbohydrate withdrawal, activities outside the home, and group accountability. The LCHF dietary toolkit aimed to address each of these issues. Given that it succeeded in doing so the toolkit will certainty need to be given strong consideration in rural SEK. In theory it will also make it more likely that healthcare providers will encourage and support an LCHF diet. Furthermore, it is the authors assumption that since patients now have a blueprint for success when implementing an LCHF diet they will be more willing to partake.

Given all the factors, cost and accessibility of appropriate food choices will play the biggest role in making an LCHF diet feasible for the target population. Ultimately, funding may be needed to ensure successful implementation and adherence to a more robust LCHF dietary program. Since the toolkit helps to show the cost saving benefits of an LCHF diet it is a great resource for rural clinics to initially consider. If success with adhering to a LCHF diet is found, further avenues may be considered. One such avenue is

the presentation of these findings to CHCSEK, who received over $7,000,000 from over 65 grants in 2017 (CHCSEK, 2017). With their proven success with grants, they would be a great resource when considering a more robust LCHF dietary program requiring outside funding.

Summary

The literature supports the benefits of an LCHF diet on type 2 diabetes. Some LCHF dietary programs have even shown success reversing type 2 diabetes. However, few have looked at the feasibility of implementing such a diet for non-affluent patients in rural communities. Cost, ease of use, food selection, and general well-being of the patient were all considered when developing the dietary toolkit. Chapter IV examines the results of the dietary toolkit project.

CHAPTER IV

Evaluation Results

Purpose

The overall purpose of the project was to identify and determine the resources needed to successfully implement a LCHF diet in rural SEK. A curiosity that guided this project was the feasibility of such a diet in a rural less affluent population such as Crawford County, Kansas. Data was collected with the goal of developing an all-encompassing LCHF dietary toolkit and answering the following research questions:

- What does an LCHF dietary toolkit look like to ensure successful implementation by non-affluent type 2 diabetics in rural Southeast Kansas?
- Is an LCHF diet a feasible option for rural clinics in Southeast Kansas for successful management of type 2 diabetes?

Description of Population

The population targeted for this project were type 2 diabetic patients in rural SEK, specifically Crawford County. A LCHF dietary toolkit has the potential to have great implications in this population. As the cost to manage type 2 diabetes continues to rise throughout the country the need to find new, cost-effective, methods to combat the disease is a must. The LCHF dietary toolkit was developed to meet this need. The toolkit was also developed to provide healthcare providers in Crawford County another resource

when treating type 2 diabetes in their clinics. The toolkit will be readily available to both providers and patients in Crawford County free of cost.

Description of Key Terms/Variables

The LCHF dietary toolkit was developed as a resource for type 2 diabetes patients in Crawford County. The toolkit includes resources to successfully implement an LCHF diet in this rural community. These resources consist of prices of groceries in Crawford County, phone applications for food tracking, online resources, LCHF books and cookbooks, and fitness center information in Crawford County.

With the completion of the LCHF dietary toolkit there are a few variables that must be considered. The first variable is the overall use of the toolkit by providers and patients. Despite the benefit the dietary toolkit may have, it will be ineffective if not utilized. Another variable that needs to be considered is the fluctuation of prices overtime. While the prices of food and fitness memberships are currently up-to-date, there is certainly potential for increases or decreases in prices overtime based on inflation or discounts.

One last variable to consider is access to the internet, and phones with internet capabilities. While the resources provided on the internet and phone applications are free, this means little if the patient has no way of accessing them. Fortunately, the Pittsburg Public Library and Arma City Library offer free internet access.

Analysis of Project Questions

This project sought to answer two questions. In order to ensure thoroughness, each question will be answered individually. Question one examined, “what does an LCHF dietary toolkit look like to ensure successful implementation by non-affluent type

2 diabetics in rural SEK?" In order to answer this question, the author set out to develop a dietary toolkit that was both cost-effective and easy to follow. An initial list of LCHF foods were developed by the author (Appendix A). Upon development of the food list a majority of the grocers in Crawford County were assessed, and a list of compliant foods from each compiled. Every item that aligned with an LCHF diet was evaluated at each grocer However, since the focus of the toolkit is for non-affluent diabetics, cost of each item was heavily considered prior to being included in the final list (Appendix B). Additionally, the author developed a sample grocery list and compared the cost from each grocer (Appendix C).

Another key component of the toolkit was identifying other LCHF dietary resources to make adhering to an LCHF diet successful. The author researched phone applications for daily food tracking, LCHF books and cookbooks, LCHF websites and blogs, and online message forums and support groups (Appendix D). Again, cost was the highest priority, followed by reviews from consumers and ease of use, as assessed by the author.

Lastly, as part of the toolkit, fitness centers in Crawford County were explored. Through phone calls, emails, and research online, three fitness centers were identified as good candidates for the less-affluent population in Crawford County. A list of the facilities' address, hours, and cost were compiled and included at the end of the toolkit (Appendix E).

The second question the project aimed to address was "is an LCHF diet a feasible option for rural clinics in Southeast Kansas for successful management of type 2 diabetes?" With regard to an LCHF diet's feasibility, an array of factors must be taken

into consideration. Cost, availability of foods, personal and healthcare providers views on the diet, food preference, time, educational resources, support, and ease of adherence. This project was able to address a number of these factors, with cost, food availability, educational resources, and healthcare providers views clearly provided.

From a financial standpoint, the cost of implementing an LCHF diet in rural SEK is anywhere between $200.00 and $350.00 a month depending on family size and number of individuals partaking the diet, with a majority of cost stemming from groceries. Additional costs factored in include initial purchases of LCHF dietary books and a monthly fitness membership. These costs are very minimal, especially when considering the Pittsburg Family Young Men's Christian Association (YMCA) has scholarships available, and a policy that no person be denied a membership based on inability to pay.

Adherence of an LCHF diet, as it relates to food availability and resources, is certainly feasible in rural SEK. Every grocer that was assessed in Crawford County provided a substantial amount of LCHF foods. Additionally, with the growth in popularity of an LCHF diet over the past couple years, online resources and phone applications are at an all-time high. While the author included some of the more cost-effective, user friendly resources, thousands of resources exist online that could be considered.

The author identified three key diabetes healthcare providers in Crawford County for feedback on the dietary toolkit. Overall, feedback received was positive. All three providers agreed that the toolkit was valuable. Specific aspects of the toolkit that were found most beneficial amongst the providers included the shopping list, prices of groceries, fitness center information, and phone applications for food tracking. One

provider also expressed the importance of the toolkit being straightforward, stating, "health care providers can simply hand this tool to a patient with very little explanation. This could save providers time."

Some constructive feedback received on the toolkit included the inclusion of recipes and weekly meal plans. Another recommendation was making the toolkit more condensed by removing the pictures of food and utilizing more of a table format. One provider did have some hesitation with an LCHF diet in general. While they liked the toolkit, the reservation stemmed from the ability to adhere to an LCHF diet long-term. This is a valid concern. Further research with the involvement of human subjects is certainly needed to better determine feasibility with respect to adherence to a LCHF diet.

Summary

The goal of the project was to develop a LCHF dietary toolkit for less affluent type 2 diabetics and identify the feasibility in implementing such a diet in rural SEK. Through extensive research of the current LCHF resources available to type 2 diabetics in rural SEK an LCHF dietary toolkit was successfully developed. To that end, a framework has been created to ease implementation of an LCHF diet in rural SEK. Feasibility, on the other hand, is hard to gauge with the number of factors that must be considered. However, based on the factors that were addressed with this project, an LCHF diet is certainly implementable, and a viable option to consider in the management of less-affluent type 2 diabetics in rural SEK.

CHAPTER V

Discussion

The overall purpose of developing the LCHF toolkit was to determine the feasibility of implementing an LCHF diet in a less affluent population of type 2 diabetics. A great deal of research has emerged at the success of LCHF diets and the potential to combat type 2 diabetes. However, minimal research exists on the feasibility of such a diet in less affluent rural populations.

Relationship of Outcomes to Research

In order to answer the projects first question, which centers on the ideal make-up of a successful dietary toolkit in less affluent populations in rural SEK, the author utilized current literature and resources readily available. Current research on LCHF diets has shown its effectiveness in not only preventing but managing type 2 diabetes. However, having the resources available to successfully implement and adhere to the diet is a must. According to Zelman (n.d.) several aspects need to be considered prior to engaging in a new diet, including following a plan, finding support, tracking meals, and adding in exercise. All of these resources are provided in the LCHF dietary toolkit.

The second question focuses on feasibility of an LCHF diet in less-affluent populations. Current estimates suggest that the average yearly spending per diabetic patient is nearly $10,000, with out of pocket expenses close to $1600, and medication

costs ranging between $200 and $500 per month (Stein, 2017). Additionally, the United States Department of Agriculture (USDA) found that the average monthly spending on food for a family of two adults is between $588.50 and $612.20 (2018). Furthermore, the average fitness membership in the United States is $58 a month (Statistic Brain Research Institute, 2018). Factoring in all these numbers, on the low end, the average monthly cost per person would be $552.25. The cost of implementing an LCHF diet, including fitness membership and other educational resources found in the LCHF dietary toolkit, on the high end, is $242.10.

Thus, through the research and development of the author's LCHF dietary toolkit, it has been deemed feasible from a financial standpoint to implement an LCHF diet in less-affluent type 2 diabetics in rural SEK. Additionally, the dietary toolkit offers a vast array of resources to help ease implementation of an LCHF diet. The toolkit also gives primary care providers in Crawford County a resource in their practice when managing type 2 diabetes.

Observations

Overall, the development of the LCHF dietary toolkit was a smooth process. While the research and development were much more consuming than anticipated, the author was impressed with the resources available to the Crawford County population. An array of grocers and fitness centers were found to provide quality, cost-effective diet and exercise options. Additionally, all grocers except ALDI offer online ordering and free pickup, with Ron's Supermarket and Dillon's going one step further and delivery the groceries for a small fee. This could be a great benefit to those with limited transportation capabilities.

One other observation the author did note throughout the development of the dietary toolkit, was the lack of emphasis placed on an LCHF diet in rural grocers, in comparison to more urban areas. With recent intrigue surrounding an LCHF diet, entire sections of grocery stores completely devoted to LCHF diets have been observed in urban grocers. Going forward, discussions with grocers about layout changes would be something to consider in Crawford County.

Evaluation of Theoretical Framework

The findings from the research and development of the LCHF dietary toolkit supports the Health Belief Model, specifically with the assumption that a person will take a health action if they belief they can be successful in taking it. The author believes that the resources provided in the LCHF dietary toolkit will give a person the confidence that they will have success with the diet.

The other theoretical framework assessed was Nancy Milio's Framework for Prevention. This framework seeks to broaden options available to populations, while making health promoting choices easier. With the development of the LCHF dietary toolkit, dietary options have expanded, while also helping ease implementation of an LCHF diet.

Evaluation of Logic Model

In chapter 1 a logic model was developed to assess short, medium, and long-term outcomes of a LCHF dietary toolkit. With regard to the short-term outcomes, the development of the dietary toolkit was successful, and the findings presented to healthcare providers in Crawford County, albeit with less feedback than anticipated. The medium- and long-term outcomes center around adherence of the diet, and increased

utilization of the diet by providers to manage type 2 diabetes. The author has intentions of revisiting these outcomes at a later date, whether it be in research or further discussions with healthcare providers in Crawford County.

Limitations

A few limitations were found upon completion of the LCHF dietary toolkit. While the LCHF diet was found feasible from a financial and resource standpoint, a limitation with the project is the lack of evidence for the feasibility in adherence to the diet long-term. Future research that includes human subjects may be a valuable consideration in ultimately establishing if an LCHF diet is feasible in rural SEK for a prolonged period.

Another limitation with the project is the number of healthcare providers for which the author received feedback. While this was somewhat intentional, as the author only wanted those directly involved with diabetes care, it may be viewed as a weakness. If and when the LCHF dietary toolkit begins to be implemented in rural SEK and more feedback is received, consideration for changes to the LCHF dietary toolkit will be made accordingly.

Lastly, time was certainly a limitation of the project. Research and data collection consumed much more time than was anticipated by the author. This led to limited time for feedback from all diabetes healthcare providers across Crawford County, and the inability to meet face to face with those sought out, as originally anticipated by the author.

Implications for Future Projects/ Research

There are multiple avenues to consider with future research. While implementing an LCHF diet was deemed feasible in rural SEK, adherence to the diet still needs to be

assessed. A diet is only as good as the ability of the patient to adhere to it. Further research needs to be conducted on adherence to an LCHF diet with the utilization of the LCHF dietary toolkit. If findings show that patients are in fact able to adhere to the diet long- term, future grant proposals should be considered. While the toolkit revealed the costs of an LCHF diet to be affordable, there is always exceptions, and additional funding should be considered.

Additionally, a project focused specifically on the grocers in Crawford County should be further explored. This may include creating a section within the stores specifically for LCHF foods. It could also include more LCHF dietary snacks at the check-out line.

One last consideration is the development of a cooking program. It was noted during research that little exists with regard to cooking classes in Crawford County. The program could encompass multiple diets from week to week and offer different recipes and meal planning.

Implications for Practice

The development of medications has been one of the greatest advancements in healthcare. They have also become a crutch that providers lean on to treat every medical ailment. Research on LCHF diets has shown its effectiveness in not only preventing but managing type 2 diabetes. The LCHF dietary toolkit offers a guide to ease implementation into an LCHF diet. Better utilization of an LCHF diet may not only prevent type 2 diabetes, but substantially cut costs associated with skyrocketing diabetes medications. Poorly controlled type 2 diabetics are often on more than one medication to control their blood sugar. Simply being able to remove one of the medications with the

use of a LCHF diet would significantly reduce the financial burden associated with diabetes management. While more research is needed on adherence with the diet long-term, utilization of the LCHF toolkit in the primary care setting is a reasonable first step.

Conclusion

The purpose of this project was to establish if an LCHF diet is a feasible option for less-affluent type 2 diabetes in rural SEK. Through the course of the project, research was conducted online and throughout Crawford County, Kansas. Ultimately, the research led to the development of an LCHF dietary toolkit. The toolkit offers an array of LCHF resources including compliant foods, grocery prices, shopping lists, phone applications, books, internet websites and blogs, accountability forums, and fitness centers. While more research is recommended, the toolkit offers a great starting foundation for implementing an LCHF diet.

Going forward the author hopes the LCHF dietary toolkit will not only bring more attention and awareness to an LCHF diet in rural SEK, but rural counties all across America. Type 2 diabetes is a serious health concern, and a large contributing factor to the steady increase in healthcare costs nationwide. With large amounts of data supporting the benefits of an LCHF diet to combat type 2 diabetes, it has to become more utilized throughout the country. Medications are great tools that should always be considered. However, there is often one medication that goes overlooked. As the famous physician Hippocrates stated so eloquently, “let food be thy medicine and medicine be thy food.”

REFERENCES

American Diabetes Association. (2018). Lifestyle management: Standards of medical care in diabetes. *Diabetes care,* 41 (Suppl.1), S38–S50.

American Diabetes Association. (2018). The cost of diabetes. Retrieved from http://www.diabetes.org/advocacy/news-events/cost-of-diabetes.html

American Heart Association. (2017). Cardiovascular disease and diabetes. Retrievedfrom http://www.heart.org/HEARTORG/Conditions/More/Diabetes/WhyDiabetesMatters/Cardiovascular-Disease Diabetes_UCM_313865_Article.jsp/#.Wfca0SMrIy4

American Heart Association. (2015). The American heart association's diet and lifestyle recommendations. Retrieved from https://www.heart.org/en/healthy-living/healthy-eating/eat-smart/nutrition-basics/aha-diet-and-lifestyle-recommendations

Bernstein, R.K. (2011). *Dr. Bernstein's diabetes solution*. New York, NY: Little, Brown and Company.

Bommer, C., Heesemann, E., Sagalova, V., Manne-Goehler, J., Atun, R., Bärnighausen, T., & Vollmer, S. (2017). The global economic burden of diabetes in adults aged 20–79 years: A cost-of-illness study. The Lancet Diabetes & Endocrinology, 5(6), 423-430.

Center for Disease Control and Prevention. (2017). New CDC report: More than 100 million Americans have diabetes or prediabetes. Retrieved from https://www.cdc.gov/media/releases/2017/p0718-diabetes-report.html

Chung, M. L., Lennie, T. A., Mudd-Martin, G., & Moser, D. K. (2015). Adherence to a

low-sodium diet in patients with heart failure is best when family members also follow the diet: A multicenter observational study. *The Journal of Cardiovascular Nursing*, *30*, 44-50. doi: 0.1097/JCN.0000000000000089

Comen, E. (2018). The poorest county in each state. Retrieved from https://www.msn.com/en-us/money/realestate/the-poorest-county-in-each-state/ss-AAuLOZQ#image=17

Community Health Center of Southeast Kansas. (2017). General information. Retrieved from http://chcsek.org/about-us/chcsek-general-information/

Crawford. (2017). Retrieved from http://www.countyhealthrankings.org/app/kansas/2018/rankings/crawford/county/outcomes/overall/snapshot

Diabetes UK. (n.d). Diabetes life expectancy. Retrieved from http://www.diabetes.co.uk/diabetes-life-expectancy.html

Eenfeldt, A. (2018). Low-carb and keto side effects & how to cure them. Retrieved from https://www.dietdoctor.com/low-carb/side-effects

Evans, N. (2018, October 23). Personal interview.

Gao, J., Wang, J., Zheng, P., Haardörfer, R., Kegler, M. C., Zhu, Y., & Fu, H. (2013). Effects of self-care, self-efficacy, social support on glycemic control in adults with type 2 diabetes. *BMC family practice*, *14*(66), 1-6. Retrieved from http://www.biomedcentral.com/1471-2296/14/66

Gibson, A. A., & Sainsbury, A. (2017). Strategies to improve adherence to dietary weight loss interventions in research and real-world settings. *Behavioral Sciences, 7*(3), 44. doi:10.3390/bs7030044

HEALclinics. (2018). HEALcare puts pre-diabetes, type 2 diabetes and obesity in remission. Retrieved from https://healclinics.com/about/

Hu, T., & Bazzano, L. A. (2014). The low-carbohydrate diet and cardiovascular risk factors: Evidence from epidemiologic studies. *Nutrition, Metabolism, and Cardiovascular Diseases, 24*, 337–343. doi: 10.1016/j.numecd.2013.12.008

Jelinek, H.F., Osman W.M., Khandoker A.H., Khalaf, K., Sungmun, L., Wael, A., Alsafar, H.S. (2017). Clinical profiles, comorbidities and complications of type 2 diabetes mellitus in patients from United Arab Emirates. *BMJ Open Diabetes Research & Care, 5*(1), 1-9. doi:10.1136/bmjdrc-2017-000427

Khodaveisi, M., Omidi, A., Farokhi, S., & Soltanian, A.R. (2017). The effect of Pender's health promotion model in improving the nutritional behavior of overweight and obese women. *International Journal of Community Based Nursing and Midwifery*, *5*(2), 165–174.

Legrand, J. (2015). *The low carb diet food diary: The ultimate diet log (personal food and fitness journal) (volume 12)*. Create Space Independent Publishing Platform.

Lin, P. J., Kent, D. M., Winn, A., Cohen, J. T., & Neumann, P. J. (2015). Multiple chronic conditions in type 2 diabetes mellitus: prevalence and consequences. *The American Journal of Managed Care, 21*(1), 23-34.

Mayo Clinic. (2017). Diabetes diet: Create your healthy eating plan. Retrieved from https://www.mayoclinic.org/diseases-conditions/diabetes/in-depth/diabetes-diet/art-20044295

Mayo Clinic. (2017). Low-carb diet: Can it help you lose weight? Retrieved from

https://www.mayoclinic.org/healthy-lifestyle/weight-loss/in-depth/low-carb-diet/art-20045831

Mcintosh, J. (2017). Ketosis: What is ketosis? Retrieved from https://www.medicalnewstoday.com/articles/180858.php

McKenzie, A. L., Hallberg, S. J., Creighton, B. C., Volk, B. M., Link, T. M., Abner, M. K., ... & Phinney, S. D. (2017). A novel intervention including individualized nutritional recommendations reduces hemoglobin A1c level, medication use, and weight in type 2 diabetes. *JMIR Diabetes*, *2*, 1-14. doi:10.1016/j.numecd.2013.12.008

McPhee, J., Zinn, C., & Smith, M. (2018). Exploring the acceptability of, and adherence to a carbohydrate-restricted diet as self-reported by women aged 40-55 years. *The Journal of Holistic Performance*, *7782018*(1), 1-16. Retrieved from https://www.holisticperformance.org/article/3206-exploring-the-acceptability-of-and-adherence-to-a-carbohydrate-restricted-diet-as-self-reported-by-women-aged-40-55-years

Merriam- Webster Dictionary. (n.d.) Adherence. Retrieved from https://www.merriam-webster.com/dictionary/adherence

Merriam-Webster Dictionary. (n.d.) Affluent. Retrieved from https://www.merriam-webster.com/dictionary/affluent

Merriam- Webster Dictionary. (n.d.) Self-management. Retrieved from https://www.merriam-webster.com/dictionary/self-management

Merriam-Webster Dictionary. (n.d). Type 2 diabetes. Retrieved from https://www.merriam-webster.com/dictionary/type%202%20diabetes

Milio, N. (1976). A framework for prevention: changing health-damaging to health-generating life patterns. *American Journal of Public Health*, *66*(5), 435-439. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1653306/pdf/amjph00492-0011.pdf

Moore, J., & Westman, E.C. (2014). *Keto clarity*: *Your definitive guide to the benefits of a low-carb, high-fat diet*. Las Vegas, NV: Victory Belt Publishing Inc.

National Aeronautics and Space Administration. (2017). The president's fiscal year 2017 budget. Retrieved from https://www.nasa.gov/sites/default/files/atoms/files/fy_2017_nasa_agency_fact_sheet.pdf

O'Byrne, L. (n.d.). How can you stick to low carb for the long term? Retrieved https://uk.atkins.com/blog/seeing-beyond-new-year-how-to-stick-to-low-carb-long-term/

Paleo Leap. (n.d.). The question of macronutrients ratios. Retrieved from https://paleoleap.com/question-of-macronutrient-ratios/

Phinney, S. (n.d.). How many carbs can i eat on a ketogenic diet? Retrieved from https://blog.virtahealth.com/how-many-carbs-ketogenic-diet/

Powers, M. A., Bardsley, J., Cypress, M., Duker, P., Funnell, M. M., Fischl, A. H., ...

United States Department of Agriculture. (2018). Official USDA food plans: Cost of food at home at four levels, U.S. average, December 2018. Retrieved from https://www.cnpp.usda.gov/sites/default/files/CostofFoodDec2018.pdf

Vivian, E. (2017). Diabetes self-management education and support in type 2 diabetes: A

joint position statement of the American Diabetes Association, the American Association of Diabetes Educators, and the Academy of Nutrition and Dietetics. *The Diabetes Educator*,*43*(1), 40-53.

Saslow, L. R., Kim, S., Daubenmier, J. J., Moskowitz, J. T., Phinney, S. D., Goldman, V., ...Hecht, F. M. (2014). A randomized pilot trial of a moderate carbohydrate diet compared to a very low carbohydrate diet in overweight or obese individuals with type 2 diabetes mellitus or prediabetes.*PloS one*, *9*(4), e91027.

Spero, B. (2016). The cost of insulin. Retrieved from https://www.diabetesselfmanagement.com/blog/the-cost-of-insulin/

Statistic Brain Research Institute. (2018). Gym membership market analysis. Retrieved from https://www.statisticbrain.com/gym-membership-statistics/

Stein, N. (2017). Getting diabetes costs you- are you prepared to pay?. Retrieved from https://www.lark.com/the-true-cost-of-developing-diabetes-lark-health

Taubes, G. (2001). The soft science of dietary fat. *Science*,*291*(5513), 2536-2545.

University of Twente. (2017). Health belief model. Retrieved from https://www.utwente.nl/en/bms/communication-theories/sorted-by-cluster/Health%20Communication/Health_Belief_Model/

Vanclay, F., Baines, J. T., & Taylor, C. N. (2013). Principles for ethical research involving humans: ethical professional practice in impact assessment Part I. *Impact Assessment and Project Appraisal*, *31*(4), 243-253.

Virta. (2018). The virta treatment: How it works. Retrieved from https://www.virtahealth.com/thevirtatreatment

Wheless, J. W. (2008). History of the ketogenic diet. *Epilepsia*,*49*, 3-5.

Westman, E.C, Yancy, W.S Jr, & Humphreys, M. (2006). Dietary treatment of diabetes mellitus in the preinsulin era (1914-1922). *Perspective in Biology and Medicine, 49*, 77–83. doi: 10.1353/pbm.2006.0017

World Health Organization. (2017). Diabetes. Retrieved from http://www.who.int/news-room/fact-sheets/detail/diabetes

Zelman, K. (n.d.). 7ways to get your diet off to a good start. Retrieved from https://www.webmd.com/diet/obesity/features/7-ways-get-your-diet-off-good-start#1

Zhuo, X., Zhang, P., & Hoerger, T. J. (2013). Lifetime direct medical costs of treating type 2 diabetes and diabetic complications. *American journal of preventive medicine, 45*(3), 253-261. Retrieved from https://doi.org/10.1016/j.amepre.2013.04.017

APPENDIX

Appendix A
LOW-CARBOHYDRATE, HIGH-FAT FOOD LIST

Anytime Foods: Healthy Fats and Non-Starchy Vegetables (65% of Diet)

- **Veggies: leafy greens, broccoli, brussels sprouts, cauliflower, asparagus, bok choy, zucchini, bell peppers, white mushrooms, avocados, onion, garlic**

- **Healthy Fats: flaxseed oil, MCT oil, coconut oil, olives, olive oil, organ meats, eggs, nut butter, avocado oil, almonds, macadamia nuts, walnuts**

- **Animal Fats: fish (salmon, halibut and mackerel), organ meats (liver, bone marrow, bacon), lamb, shellfish (crab, lobster, shrimp), ghee**

- **Nuts and Seeds: nut and seed butter, almonds, pecans, cashews, pine nuts, sunflower seeds, flaxseed, brazil nuts**

- **Other: 100% dark organic cocoa powder or chocolate, spirulina, almond flour, mineral water, tea or coffee (no added sugar), unsweetened nut milk (almond milk, hemp milk, coconut milk**

Moderation Foods: Proteins (20% of Diet)

- **Animal Protein: red meat, chicken, turkey, wild game, duck, pork**

- **Full Fat Dairy Products: sour cream, cottage cheese, cream cheese (with no added sugars), heavy cream**

Even More Moderation Foods: (15% of Diet)

- **Small Amounts of Berries: raspberries, blackberries, blueberries**

- **Legumes: green peas and beans**

- **Sugar Alcohols: xylitol, sorbitol**

Foods to Avoid

- **Grains: bread, oatmeal, cereals, bagels, pancakes, waffles**

- **Refined Sugar: cookies, cakes, ice cream, muffins, doughnuts, cupcakes (AKA desserts)**

Appendix B
CRAWFORD COUNTY GROCERY STORE BREAKDOWN
(Alphabetical)

Aldi Supermarket

3109 N Broadway St. Pittsburg, KS 66762
Mon-Sun 0900AM-08:00PM

BEVERAGES

Friendly Farms Vanilla Unsweetened Almond Milk
$2.39 ½ gallon

PureAqua Lime Belle Vie Sparkling Flavored Water
$2.39

Beaumont Classic Ground Coffee
$$4.79/ 30oz

BREAKFAST

Never Any!
Chicken Breakfast Sausage
$2.99 a pack

Appleton Farms Never Any!
Hickory Bacon
$4.99 a pack

CANNED & PACKAGED

Northern Catch
Sardines in Oil
$0.89

CONDIMENTS & SAUCES

Simply Nature
Organic Creamy Peanut Butter
$1.79

Simply Nature
Creamy Almond Butter
$4.79

Burmans Real Mayonnaise
$2.19

Burmans Mustard
$1.19

Burmans Hot Sauce
$1.99

Tuscan Garden Ranch Dressing
$1.49

DAIRY

Simply Nature
Organic Whole Milk Plain Yogurt
$3.69/32oz

Specially Selected
Aged Reserved White Cheddar
$2.49

Simply Nature
Organic Cage Free Brown Eggs
$1.99

Fit & Active®
2% Milk American Singles
$1.99

Friendly Farms Cottage Cheese
Small Curd 4% Milk Fat
$2.29/24oz

Countryside Creamery
Butter
$2.99/ 4 sticks

FROZEN

Kirkwood
Fresh Chicken Wings
$8.99 a bag

Simply Nature Frozen
Organic Blueberries
$2.29

INGREDIANTS

Carlini Extra Virgin Olive Oil
$3.79

Sweet Additions Stevia Sweetener
$3.29 a box

MEAT & SEAFOOD

80% Lean Ground Beef
$2.99

80% Lean Ground Beef Patties
$3.69

Kirkwood
Fresh Boneless Skinless
Chicken Breasts
$5.99 per pack

Lunch Mate Never Any!
Oven Roasted Turkey Breast
$3.29

s

Lunch Mate Never Any!
Uncured Black Forest Ham
$3.29

Never Any!
Chipotle Chicken Sausage
$2.99

Fresh Tilapia Fillets
$5.79/lb

Fresh Atlantic Salmon
$7.89/lb

PRODUCE

Avocados
$.39 each

Blackberries
$2.49 pt.

Blueberries
$1.69 pt.

Grapefruit
$2.99/5lb

Lemons
$2.49 for 4

Limes
$1.49/ 16oz

Raspberries
$2.49 pt.

Asparagus
$2.49

Bell Peppers
$1.49 for 3 pack

Broccoli
$1.29 a crown

Brussels Sprouts
$2.49

Carrots
$0.99

Cauliflower
$1.69

Celery
$0.89

Cucumbers
$0.39 each

Garlic
$0.99

Green Beans
$1.49

Mushrooms
$1.59

Onions
$1.69

Romaine
$1.39

Tomatoes
$1.49 for 4

Simply Nature
Organic Mixed Greens
$2.49

<u>SNACKS</u>

Simply Nature
Raw Almonds, Pecans, and Pistachio Kernels
$4.49

Simply Nature
Raw Cashews, Walnuts, and Macadamia Nuts
$4.49

Elevation by Millville
Caramel Chocolate Peanut Nougat Advance Bars
$4.99 a box

Moser Roth
85% Dark Chocolate
$1.99

Dillons
2600 N Broadway St. Pittsburg, KS 66762
Mon-Sun 0600AM-11:00PM

BEVERAGES

Kroger® Seltzer Water Naturally Flavored Lemon Lime Caffeine Free

12 cans / 12 fl oz $2.79

Folgers Classic Roast Coffee

30.5 Oz $8.49

Simple Truth™ Unsweetened Vanilla Almondmilk

1/2 gal $2.79

BREAKFAST

Heritage Farm™ Sliced Bacon

12 oz $2.99

Kroger® Mild Pork Sausage Roll

16 oz $2.29

CANNED AND PACKAGED

Chicken of the Sea Sardines in Oil Lightly Smoked

3.75 oz $1.00

CONDIMENTS & SAUCES

Kroger® Chunky Blue Cheese Dressing

16 fl oz $1.50

Louisiana Hot Sauce

6 Fl Oz $1.19

Kroger® Classic Mayo

15 fl oz $1.79

Kroger Yellow Mustard

8 oz $0.49

Kroger Creamy Ranch Dressing

16 fl oz $1.50

Kroger® Creamy Peanut Butter

16 oz $1.50

Yucatan Mild Guacamole

8 Oz $3.99

DAIRY

The Greek Gods Traditional Plain Greek Yogurt

24 oz $3.69

Kroger® CarbMaster™ Vanilla Cultured Dairy Blend

***6 oz* $0.40**

Dillons Grade AA Medium Eggs

12 Count $0.89

Kroger® Whipping Cream

1 pt $1.89

Simple Truth Organic™ Whole Milk

1/2 gal $2.99

Kroger® 4% Milkfat Small Curd Cottage Cheese

16 oz $1.25

Kroger American Cheese Singles

12 Oz $1.59

Kroger Sharp Cheddar Cheese Bar

8 oz $1.77

Kroger® Unsalted Butter 4 Count

16 oz $2.50

Kroger® Original Sour Cream

16 oz $1.25

Kroger Cream Cheese

8 oz $1.19

<u>FROZEN</u>

Heritage Farm™ Seasoned Quarter Pound Beef Patties 8 Count

***2 lb* $4.99**

Tyson Boneless Skinless Chicken Breasts

3 lb $8.99

Tyson All Natural Chicken Wing Sections

2.5 lb $7.99

Simple Truth Organic™ Berry Medley Frozen Fruit

10 oz $3.29

Kroger® Mixed Vegetables Meal Ready Sides

12 oz $1.00

Kroger Meal-Ready Broccoli & Cauliflower

12 oz $1.00

Real Good Pizza Co. Uncured Pepperoni Pizza

8.7 oz $5.99

Real Good Pizza Co.Cauliflower Crust Cheese Pizza

17 oz $7.99

<u>INGREDIANTS</u>

Kroger® Extra Virgin Olive Oil

17 fl oz $3.69

Kroger® Stevia Blend Packets

80 ct $3.99

MEAT & SEAFOOD

Kroger® Mild Italian Sausage

18 oz $2.99

Kroger® Ground Beef 80% Lean

1 lb $3.49

Private Selection Cracked Pepper Coho Alderwood Smoked Salmon

4oz $5.99

Sea Cuisine Smart Flavor Pan Sear Garlic & Herb Tilapia
9oz $8.99

Tyson All-Natural Chicken Breast Boneless & Skinless
$3.99/lb $7.59

Private Selection™ Wildflower Honey Ham

8 oz $5.89

Private Selection™ Oven Roasted Turkey Breast

8 oz $5.89

Private Selection™ Prosciutto & Mozzarella Rolls

5 oz $4.99

PRODUCE

Squash - Spaghetti

Each $2.37

Kroger® Baby Bella Sliced Mushrooms

8 oz $2.79

Brussels Sprouts

1 Lb $2.99

Kroger® Classic Garden Salad

24 oz $2.49

Simple Truth Organic™ Baby Spinach

5 oz $3.00

Tomatoes - On The Vine

Each **$0.45**

Asparagus

Each **$2.99**

Lemons - Large

1 each **$0.89**

Red Bell Pepper

1 ct $1.25

Kroger Cut & Peeled Baby Carrots

1 lb $1.29

Garlic

1 each $0.59

Onion - Sweet - Yellow

Each **$0.50**

Avocado - Medium

***1 each* $0.99**

Limes

***1 ea* $0.59**

Broccoli - Crowns

Each $1.30

Pepper - Jalapeno

Each $0.20

Green Beans

1 lb $1.99

Cucumbers

Each $0.50

Blueberries

1pt. $2.00

SNACKS

Kind Nuts & Spices Dark Chocolate Nuts & Sea Salt Bar

4 ct / 1.4 oz $4.99

Kroger® Unsalted Mixed Nuts

10.3 oz **$4.99**

Lindt EXCELLENCE 85% Cocoa Extra Dark Chocolate Bar
3.5 oz $2.99

Kroger® Jumbo Pitted Ripe Olives

5.75 oz $1.29

Kroger® Medium Pitted Ripe Olives

6 oz $1.29

Ron's Supermarket

310 East Centennial Drive, Pittsburg, Kansas 66762
Monday- Saturday 06:30AM-10:10PM Sunday 07:00AM-10:00PM

BEVERAGES

Almond Breeze Unsweetened Vanilla Almond Milk - 64 fl oz 1/2 Gallon	1 $3.89
Atkins Advantage Shake - Vanilla - 44 fl oz 4 - 11 fl oz Shakes.	**1 $5.99**
12 fl. oz. each. 100% All-Natural Sparkling Seltzer Water. Unsweetened and zero calories. Splash of all-natural lemon lime flavor.	1 $3.49
Folgers Ground Coffee - 100% Colombian - Medium-Dark -10 oz	**1 $4.85**
Hiland Whole Milk - 64 fl oz 1/2 Gallon	1 $1.99

BREAKFAST

Always Save Sliced Bacon - 12 oz	1 $2.49
Banquet Beef Sausage Links - 6.4 oz	**1 $2.19**

CANNED & PACKAGED

Chicken of the Sea Salmon - Chunk Style Skinless Boneless In Water - 5 oz	**1 $2.49**
Chicken of the Sea Sardines - In Oil Lightly Smoked - 3.75 oz	1 $0.99

CONDIMENTS & SAUCES

Always Save Dressing - Ranch - 16 fl oz	**1 $1.29**
Always Save Hot Sauce - 12 oz	1 $1.09
Always Save Peanut Butter - Creamy - 18 oz	**1 $1.89**
Barney Butter Almond Butter - Smooth - 10 oz All Natural	1$12.89
Best Choice Chunky Blue Cheese Dressing - 16 oz	**1 $1.79**
Drew's Dressing & 10 Minute Marinade - Romano Caesar - 12 fl oz	1 $3.09

Wholly Guacamole Classic Guacamole - 12 oz Bowl	**1 $5.49**

DAIRY

Best Choice Cottage Cheese - 24 oz	1 $2.99
Best Choice Cream Cheese - 8 oz	**1 $1.69**
Best Choice Medium Eggs - 1 doz	1 $1.49
Country Crock Buttery Spread Original - Twin Pack - 15 oz	**1 $2.69**
Mini Babybel Original Semisoft Cheese - 4.5 oz 6 count. 100% natural cheese	1 $4.29
The Greek Gods Greek-Style Yogurt - Traditional Plain - 24 oz Whole milk Greek yogurt.	**1 $4.49**

FROZEN

Best Choice Mixed Vegetables Steamer - 12 oz	1 $1.89

INGREDIANTS

Stevia In The Raw Packet Box - 1.75 oz 50 count	**1 $3.49**
Vigo Olive Oil - Pure - 8.5 fl oz	1 $3.59

MEAT & SEAFOOD

Ball Park Flame Grilled Beef Patties - 16.2 oz	1 $7.75
Best Choice Chicken - 2.5 oz Thin Sliced	**1 $0.75**
Best Choice Chicken Breast - Boneless Skinless - 3 lb	1 $7.99
Best Choice Turkey - 2.5 oz Thin Sliced	**1 $0.75**
Boar's Head Antipasto Genoa Salame & Picante Provolone Slices - 4 oz	1 $5.99
Salmon Sockeye Salmon Filet- 1Lb	**1 12.99**

PRODUCE

Bell Peppers Green - 1 Large	**1 $1.39**
Dole Chopped Caesar Salad Kit - 1 ct	1 $4.29
Dole Premium Romaine Carrot & Red Cabbage Leaf Lettuce - 9.5 oz	**1 $3.39**
Dole Spinach - 8 oz	1 $2.99
Eat Smart Broccoli & Cauliflower - 12 oz	**1 $2.49**
Fresh Green Asparagus - 0.25 lb Large	1 $0.67
Fresh Yellow Crookneck Squash - 9 oz	**1 $1.01**
Fresh Grown Blueberries - 6 oz	1 $2.69
Grapefruit Pummelo - Red - 1	**1 $3.69**
Green Giant Baby Carrots - 16 oz	1 $1.29
Hass Avocadoes - 1 lb Large Size	**1 $1.79**
Tomatoes Plum Roma Tomatoes - 4 oz	1 $0.47

SNACKS

Always Save Mixed Nuts with Peanuts - 12 oz	**1 $2.39**
Kind Dark Chocolate Nuts & Sea Salt - 6 oz 4-pack bars	1 $5.49
Lindt Dark Chocolate- 85% Dark	**1 $2.79**

Walmart Market
1011 E Centennial Dr, Pittsburg, KS 66762
Mon-Sun 0600AM-1200AM

BEVERAGES

LaCroix Sparkling Water, Lime, 12 Fl Oz, 8 Count
$3.38 each

Folgers Classic Roast Ground Coffee, 48-Ounce
$9.98 each

Great Value Unsweetened Vanilla Almond Milk, 64 oz
$2.36 each

Great Value Original Unsweetened Almond Milk, 0.5 Gal
$2.36 each

BREAKFAST

Great Value Original Bacon, 12 oz
$3.33 each

Jimmy Dean® Premium Pork Regular Sausage Roll, 16 oz
$3.88 each

CANNED & PACKAGED

Ocean Prince Lightly Smoked Sardines in Oil, 3.75 oz
$0.98

CONDIMENTS & SAUCES

Great Value Creamy Caesar Dressing & Dip, 16 oz
$0.88 each

Sriracha Hot Chili Sauce, 9 oz
$1.76 each

Great Value Classic Ranch Dressing & Dip, 16 fl oz
$0.88 each

Great Value Real Mayonnaise, 30 fl oz
$2.98 each

Great Value Yellow Mustard, 14 oz
$0.98 each

Great Value Creamy Peanut Butter, 40 oz
$3.32 each

Sam's Choice Slow Roasted Creamy Almond Butter, 12 oz
$4.98 each

Mama Lupe's Medium Salsa, 16 oz
$2.58 each

Freshness Guaranteed Guacamole, Mild, 8 oz
$2.88 each

DAIRY

Great Value Ultra-Pasteurized Real Heavy Whipping Cream, 16 Oz
$2.34

Great Value All Natural Grade A Sour Cream, 16 Oz
$1.00 each

Great Value Unsalted Sweet Cream Butter Sticks, 16 Oz., 4 Count
$2.98 each

Great Value Large Grade A Eggs, 12 ct
$0.98 each

Great Value Blended Whole Milk Plain Greek Yogurt, 32 oz
$3.62 each

Great Value Whole Milk, 1 Gallon, 128 Fl. Oz
$1.68 each

Great Value 4% Milkfat Small Curd Cottage Cheese, 24 Oz
$2.54 each

Frigo Cheese Heads String Cheese, 16 ct
$3.98 each

Great Value Sharp Cheddar Cheese, Block, 8 oz
$2.22 each

Great Value American Cheese Singles, 12 oz
$1.48 each

Great Value Gluten-Free Cream Cheese, 8 Oz
$1.46 each

Mini Babybel Original Semisoft Cheese, 6ct
$2.68 each

FROZEN

Great Value Frozen Wing Sections 4.0 Lbs
$10.42 each

Real Good Pepperoni & Cheese Chicken Poppers, 9 oz Box, 9 Count
$4.96 each

Real Good Pepperoni Pizza Snack Bites, 8.5 oz Box, 8 Count
$5.67 each

Great Value All Natural Boneless Skinless Chicken Breasts, 3 lbs.
$6.14 each

Great Value Brussels Sprouts, 12 oz
$0.80 each

Green Giant Riced Veggies Cauliflower, 12.0 OZ
$2.48 each

Great Value Steamable Mixed Vegetables, 12 oz
$0.80 each

Great Value Whole Berry Medley, 16 oz
$1.98 each

Great Value Broccoli Florets, 12 oz
$1.00 each

INGREDIANTS

Great Value: 100% Extra Virgin Olive Oil, 25.5 oz
$5.94 each

Wisdom Natural SweetLeaf Stevia Sweetener 35ct.
$4.50

MEAT & SEAFOOD

Gorton's Classic Grilled Salmon Fillets, 2 count
$3.94 each

Sam's Choice Atlantic Salmon 12 oz
$7.68 each

Frozen Cooked Large Shrimp, 12 oz
$5.64 each

Great Value Tilapia Fillets, 1 lb
$3.48 each

Nathan's Famous Original Beef Jumbo Franks, 8 Hot Dogs per Package
$3.67 each

80% Lean/20% Fat, Ground Beef Chuck Patties, 4 ct, 1.33 lb
$5.98 each

80% Lean/20% Fat, Ground Beef Chuck, 1 lb
$3.78 each

PERDUE FRESH CUTS Thin Sliced Chicken Breasts
$6.09 each

Sara Lee Honey Roasted Whole Turkey Breast, Deli Sliced
$6.98 / lb

Sara Lee® Premium Meats Honey Ham
$5.98 / lb

Fiorucci 5 oz. Prosciutto & Mozzarella Panino
$4.97 each

Taylor Farms BLT Salad w/ Chicken, 6.5 oz.
$2.98 each

Hormel Natural Choice Honey Deli Ham, 8 Ounce
$3.48 each

Oscar Mayer Deli Fresh Smoked Turkey Breast, 9 oz Tray
$3.48 each

Oscar Mayer P3 Turkey, Almonds, Monetary Jack & Blueberries Portable Protein Pack, 3.2 oz Tray
$2.50 each

PRODUCE

Spinach, 16 oz
$2.98 each

Marketside Premium Romaine Salad, 9 oz
$2.38 each

Marketside Cauliflower Florets, 16 oz
$2.48 each

Spice World Fresh Garlic Bulbs, 3 count
$1.48 each

Marketside Broccoli Florets, 12 oz
$2.48 each

Peeled Baby-Cut Carrots, 2 lbs
$2.74 each

Sliced Mushrooms, 8 oz
$1.98 each

Asparagus, bunch
$3.27 / lb

Whole Carrots 1 Lb Bag
$0.78 each

Broccoli Crowns
$1.88 / lb

Red Bell Pepper
$1.68 each

Sweet Onions
$1.18 / lb

Roma Tomatoes
$1.48 / lb

Cucumber
$0.78 each

Green Bell Pepper
$0.88 each

Organic Hass Avocados, 3-5 Count Bag
$4.96 each

Hass Avocados
$0.78 each

Limes
$0.38 each

Lemons
$0.68 each

Red Grapefruit
$1.18 each

Fresh Blackberries, 6 oz
$2.28 each

Blueberries, 11 oz
$4.28 each

SNACKS

Atkins Endulge Chocolate Peanut Butter Cups, 5-pack
$5.48

Atkins Chocolate PB Pretzel Bar, 1.7oz, 5-pack
$7.48

Lindt Excellence 85% Cocoa Extra Dark Chocolate, 3.5 oz
$2.68 each

Medallion Salted Mixed Nuts, 8 oz
$2.00 each

KIND Minis, 2 Flavors, Dark Chocolate Nuts & Sea Salt + Caramel Almond & Sea Salt Mini KIND Bars, 10 ct
$5.98 each

Appendix C
SAMPLE GROCERY LIST (bi-weekly)

Produce

2 Avocados
1 Green Bell Pepper
1 Red Bell Pepper
1 Asparagus
1 Package Carrots
2 Tomato
1 Broccoli
1 Cauliflower
1 Salad Kit
1 Package Blueberries

Meat and Seafood

1 Package of Bacon
1-3lb Chicken Breast
1 Package Beef Patties
1 Package Thin Sliced Turkey/Chicken
1 Frozen Package Salmon/Tilapia
1 Can of Sardines
½ lb Salmon

Dairy

1 Dozen Eggs
1 Container Cottage Cheese
1 Container Full Fat Greek Yogurt- Plain
1 Pack Butter
1 Package Cheese (per preference)

Condiments/ Sauces

1 Salad Dressing (per preference)
1 Hot Sauce/Salsa
1 Olive Oil
1 Peanut Butter
1 Package of Stevia

Snacks

1 Can Mixed Nuts
1 Package Kind Bars/Low Carb Snack Bar

1 Dark Chocolate Bar (85% dark)

Beverages

½ Gallon Almond Milk (Unsweetened)
1 Container Coffee
1 Pack Sparkling Water

Cost by Grocer (pre-tax)

Wal Mart Market: $87.77

Aldi Supermarket: $88.55

Dillons: $88.68

Ron's Supermarket: $94.50

Appendix D
ADDITIONAL LCHF RESOURCES

LCHF Dietary Tracking Phone Applications (Android and Apple)
(Free)

- MyFitnessPal (free version)
- Total Keto Diet*
- FatSecret
- Carb Manager (free version)

***After going through all the phone applications the author recommends the Total Keto Diet application. The phone app lets you track carbohydrates, fat, and protein, gives great recipes, and allows one to create grocery lists, all completely free. It is also user friendly.**

LCHF Dietary Books
(Must be less than $10.00 to be considered)

- The Complete Ketogenic Diet for Beginners: Your Essential Guide for Living the Keto Lifestyle by Amy Ramos. $7.42 from Amazon.

- The Easy 5- Ingredient Ketogenic Diet Cookbook by Jen Fisch. $9.18 from Amazon.

  Both books are at the top of the Amazon Best Sellers in Low Carb Diets.

LCHF Dietary Websites and Blogs

- www.dietdoctor.com
- www.ruled.me
  ***Offers a comprehensive LCHF 30-day diet plan for free**
- www.ketoconnect.net
  ***Offers a wide selection of free recipes**

Online Message Forums and Support Groups

- www.ketogenicforums.com
- www.lcneighborhood.com
- https://lowcarber.org

Disclaimer: The author has no affiliation with any of these resources. These were chosen after extensive research, personal usage, and cost analysis.

Appendix E
FITNESS CENTERS
(Alphabetical)

Pinamonti Physical Therapy and Wellness Center

1014 Mt. Carmel Place
Pittsburg, Ks, 66762
Phone: 620-235-1500
Hours:
Monday-Friday
5:00 a.m. to 9:00 p.m.
Saturday
7:00 a.m. to 6:00 p.m.
Sunday
8:00 a.m. to 6:00 p.m.
Rates: Individual: $36.50, Couples: $56.50, Family: $85.00

Tri Fitness 24/7

2609 N Broadway, Suite A
Pittsburg, Ks, 66762
Phone: 620-404-5155
Email: membership@trifintness247.com
Hours:
Open 24 hours a day 7 days a week
Rates: $29.00 a month*
***Personal training at no extra cost**

YMCA of Pittsburg

1100 N Miles St
Pittsburg, Ks, 66762
Phone: 620-231-1100
Hours:
Monday- Friday
5:00 a.m. to 10:00 p.m.
Saturday
8:00 a.m. to 6:00 p.m.
Sunday
12:00 p.m. to 8:00 p.m.
***Rates: Annually- (monthly)**
Family - $395- ($32.91/month)
Adult 25-29 - $285 (23.75/month)
Senior Adult 60-Plus - $190 ($15.83/month)
Senior Family - $250 ($20.83/month)
Young Adult 18-24 - $265 ($22.00/month)
***10% Military Discount**
***Scholarships available (No one denied membership due to inability to pay)**