Melody L Hess, hereby submit this original work as part of the requirements for the degree of Master of Science in Nutrition.

It is entitled:
Development of a Nutrition Education Program Aimed at Diabetes Prevention and Management in an Urban Appalachian Population

Student's name: Melody L Hess

This work and its defense approved by:

Committee chair: Abigail Pearis, Ph.D.
Committee member: Sarah Couch, Ph.D.
Development of a Nutrition Education Program 
Aimed at Diabetes Prevention and 
Management in an Urban Appalachian 
Population

by
Melody Hess

July 2013

Bachelor of Science, Biological Sciences
University of Wisconsin-Milwaukee
Master of Science, Nutritional Sciences
Department of Nutritional Sciences
College of Allied Health Sciences

Abigail Peairs, PhD
Committee Chair
Abstract

Development of a Nutrition Education Program Aimed at Diabetes Prevention and Management in an Urban Appalachian Population

by

Melody Hess

Background: The prevalence of type 2 diabetes (T2D) has increased considerably within the last few decades as the incidence of obesity continues to climb.\(^1\)\(^3\) Both obesity and T2D preferentially strike individuals of low socioeconomic status, who lack the financial means to obtain healthy and nutritious food and often live in urban areas where the availability of such foods is severely limited.\(^1\)\(^4\) One especially hard hit population is a group of Appalachian migrants residing in the urban Lower Price Hill (LPH) section of Cincinnati, Ohio. Prevalence of T2D is alarmingly high in this community, and this is accompanied by a striking absence of knowledge related to the causes and management of this disease.\(^1\)\(^5\)\(^6\) There is a great need for nutrition education programs targeted at this population in hopes of mitigating T2D risk and development and ensuring that those with the illness understand how to manage it appropriately.

Methods: Detailed investigation into the foremost concerns of residents of the LPH community revealed substantial need for a nutrition education program focused on diabetes prevention and management.\(^5\) Members of the LPH community specifically requested a healthy cooking and nutrition class that could be implemented within their community, since transportation limits the mobility of many of the individuals residing in this area. After researching the design of successful nutrition education programs, the background and characteristics of urban Appalachian migrants, and taking the LPH residents’ needs into account, the LPH Nutrition Education Program was developed. Nutrition educators from the University of Cincinnati presented a trial of the program to LPH residents, and the feedback from this trial was used to inform further development of the program.

Results: At the completion of 2 sessions (n=16 participants), program feedback was very positive, indicating that participants enjoyed the classes, learned a great deal from them, felt more knowledgeable about diabetes and how it can be prevented and managed, and gained encouragement and a sense of hopefulness in their ability to care for themselves and their families. Dietary changes were noted among the participants in session 1 with a significant decrease in intake of high fat foods from pre to post intervention (p<0.05), and a trend for a
significant increase in fruits and vegetables (p=0.09). Diabetes-related nutrition knowledge did not change significantly in either session.

**Conclusions:** These results, although preliminary, suggest that the LPH Nutrition Education program may provide a useful approach to improving diet quality among urban Appalachians at high risk for developing T2D. With further development of the program and a larger participant pool, it is anticipated that significant changes in nutrition knowledge and fruit and vegetable intake will occur, in addition to the changes already observed, in future administrations of the program.
# Table of Contents

**Introduction**  
7

**Literature Review**  
8  
- Definition of Type 2 Diabetes  
- Prevalence of Type 2 Diabetes  
- Health Complications Associated with Type 2 Diabetes  
- The Influence of Diet and Physical Activity on Type 2 Diabetes  
- Theories Guiding the Development of Nutrition Education Programs  
- Characteristics of Appalachian Populations and the Urban Appalachians of LPH  
19

**Methods**  
22  
- Rationale for LPH Nutrition Education Program Structure and Content  
- LPH Nutrition Education Program Trial  
- Course Content  
- LPH Nutrition Education Program Delivery  
31

**Results**  
32  
- Participants  
- Outcomes  
32

**Discussion**  
35

**Conclusion**  
40

**Appendices**  
42-43  
- Appendix 1  
- Appendix 2  
44

**Bibliography**  
45
List of Tables and Figures

Table 1A. LPH Nutrition Education Program Summary of Qualitative Feedback, Program Trial 42

Table 1B: LPH Nutrition Education Program Summary of Qualitative Feedback, Session 1 43

Table 2: LPH Nutrition Education Program Pre-and Post-intervention Assessment Scores 44
Introduction

As the rate of obesity in America continues to rise, an increasing number of individuals are developing type 2 diabetes (T2D) and are faced with the challenge of managing it. Especially hard hit are those in low income urban populations who often live in food deserts and therefore have limited access to nutritious food, obtain inadequate healthcare due to the high cost of receiving such care, and lack knowledge pertaining to the relationship between diet and health because of the absence of nutrition education in their communities. Among these populations is a group of impoverished individuals of Appalachian descent who have migrated to an urban section of Cincinnati, Ohio called Lower Price Hill (LPH). The prevalence of T2D is especially high in this community, with a disease rate of 21.1% as compared to the 12.3% seen in the city of Cincinnati as a whole.

Even more alarming than the skyrocketing incidence of diabetes, however, is the LPH residents’ lack of awareness regarding their health and condition. A survey of LPH adults found that 7.9% did not know whether or not they had diabetes, and 10.5% of those with diabetes were unaware of whether or not their diabetes was controlled. This compares to 1.0% and 1.5%, respectively, for the entire state of Ohio. More than 67% of LPH residents reported a family history of diabetes, but 22.5% indicated that they did not know if they had a family history of diabetes. When administered a diabetes knowledge test, the average correct score in this population was 64.8%. This score was the same for both individuals with and those without diabetes, which provides strong evidence that diabetes education is severely lacking, even for those living with the condition. Approximately 35% of the LPH residents reported
fair/poor health status, 72.5% were overweight or obese, and 26.3% were at risk for food insecurity. \(^5\)

LPH residents cited diabetes as one of their primary concerns. In an effort to address these concerns, the Urban Appalachian Council (UAC), which is a community advocacy group focused on improving the lives and health of urban Appalachians in Cincinnati, sought input from the LPH residents regarding the types of interventions that would be helpful and effective within their community. These individuals expressed strong desire for education of both youth and adults in diabetes prevention and management and provision of healthy cooking and nutrition classes. As a result, the UAC sought the assistance of nutrition experts at the University of Cincinnati to develop a nutrition education program for members of the LPH community. Since transportation serves as a major barrier to access among these individuals, the program needed to be administered within the community itself and its available facilities. This thesis details the development, feasibility, and acceptance of the LPH Nutrition Education program delivered to this urban Appalachian population.

**Literature Review**

T2D is often attributed to three primary causes: 1) overweight/obesity, 2) poor diet, and 3) lack of physical activity.\(^2,8,12-14\) This is in contrast to type 1 diabetes (T1D), which is an autoimmune condition in which the immune system destroys the insulin-producing pancreatic beta cells, independent of one’s food and exercise-related behaviors.\(^7,12\) As such, many cases of T2D can be prevented by maintaining a healthy weight, improving dietary quality, and engaging in regular physical activity.\(^2,8,13-15\) Educating individuals about diabetes prevention and
management can make a substantial difference in the lives of those whose risk of developing T2D is high. The literature review that follows defines T2D, discusses its prevalence within LPH and the United States as a whole, and provides the rationale for implementing healthy cooking and nutrition education programs targeted at diabetes prevention and management.

**Definition of Type 2 Diabetes**

The most common form of diabetes is type 2, and it is a condition in which the body stops responding to the insulin that is produced (referred to as insulin insensitivity or insulin resistance), and the body eventually either fails to produce adequate insulin to meet normal physiological demands, or can stop producing insulin all together. During digestion, the body metabolizes ingested food into glucose, which is absorbed and used to fuel cellular activities. Insulin is the hormone responsible for regulating blood glucose levels, as the amount of glucose coursing through the blood stream must be kept in strict control. Insulin accomplishes this by triggering glucose uptake by cells, enabling it to leave the bloodstream. Without insulin, or in the case of insulin insensitivity, glucose remains elevated in the bloodstream, leading to cellular energy deprivation and spilling of glucose in the urine.

In a healthy individual, blood glucose is easily maintained between 80 – 120 mg/dL, but in a diabetic individual, blood glucose can soar to above 400 mg/dL and plummet to below 40 mg/dL, both of which are extremely dangerous and can wreak devastating effects throughout the body. A physician will typically confirm a diabetes diagnosis with a fasting plasma blood glucose test, which measures how long it takes a controlled dose of glucose to leave the bloodstream. When a physician suspects diabetes, diagnosis is confirmed using four primary
criteria: 1) glycated hemoglobin (HbA1c) value of 6.5% or higher, 2) fasting plasma glucose ≥ 126 mg/dL (7.0 mmol/L), 3) 2-h plasma glucose ≥ 200 mg/dL (11.1 mmol/L) during an oral glucose tolerance test using 75 g of glucose, and/or 4) classic symptoms of hyperglycemia (e.g., polyuria, polydipsia, and unexplained weight loss) or hyperglycemic crisis with a random plasma glucose of 200 mg/dL (11.1 mmol/L) or higher.¹⁴

   Symptoms of uncontrolled T2D include excessive thirst, frequent urination, hunger, weight loss, fatigue, blurred vision, and headaches.¹⁹ The breath of an individual whose diabetes is uncontrolled may also take on a sweet and slightly fruity odor due to the production of ketones, which are used for fuel in the absence of glucose.²⁰ All of these symptoms are directly related to the energy deprivation resulting from the inability of glucose to enter cells. In response to high levels of glucose in the blood, the body stimulates thirst mechanisms in an effort to return the blood to its normal osmolarity.²¹ Hunger and weight loss ensue as the body loses its source of fuel in the urine instead of utilizing it for vital physiological processes. Headaches and blurred vision can be attributed to insufficient glucose in the brain, which uses glucose exclusively except in rare, emergency situations. Once diagnosed, type 2 diabetics must constantly work to keep their blood glucose levels within as close to the normal physiological range as possible—through diet, weight management, and physical activity—in order to avoid suffering from the symptoms cited above. In some cases, medication is also a necessary component of diabetes management.

   Healthcare practitioners rely on a number of diagnostic tools to evaluate a patient’s control over their diabetes. Patients can track and record their own blood sugar on a daily basis
with a simple finger prick. The finger prick provides a small blood sample from which a glucose monitor can measure the amount of sugar in the blood. In addition to this daily record, physicians use a small blood sample to calculate hemoglobin A1c (HbA1c), which serves as an indication of the patient’s average blood glucose over a three month period. Maintaining a HbA1c level below seven percent has been shown to help delay and/or prevent disease-related complications. Therefore, careful disease management can have a dramatic impact on an individual’s long-term health and well-being.

**Prevalence of Type 2 Diabetes**

According to the National Institutes of Health, 8.3% of the United States population has diabetes. Of these 25.8 million people, a vast majority (approximately 95%) are type 2 diabetics. T2D currently affects approximately 7.2% of the United States population and is estimated to be the seventh leading cause of death in this country. In 2007, the American Diabetes Association estimated that the total cost of diabetes in America is approximately $218 billion, with 43 billion of these dollars attending to people who are not officially diagnosed with diabetes. On average, healthcare costs for individuals with diagnosed diabetes are about 2.3 times higher than for those without diabetes.

In addition to those whose diagnoses have been confirmed, an increasing percentage of the population suffers silently. The National Diabetes Fact Sheet, published by the Centers for Disease Control, proposes that seven million people with diabetes are undiagnosed, and that 79 million people have prediabetes, which is defined as having blood glucose levels that are higher than normal, but not yet high enough to be considered full-blown diabetes. Minorities and
those of low socioeconomic status are disproportionately affected by T2D and more frequently lack awareness of having it, due to difficulty with accessing healthcare. While 7.1 percent of non-Hispanic whites have diabetes, 12.6 percent of non-Hispanic blacks and 11.8 percent of Hispanics have the disease.³,²³

Though T2D affects adults and youth alike, we are seeing an ever-increasing number of children developing the disease as rates of overweight and obesity in young Americans continue to climb.³ The SEARCH for Diabetes in Youth Study suggests that about 3700 youths below the age of twenty are diagnosed with T2D every year.²⁴ While T2D can be effectively managed, there is no cure. This means that those who develop T2D will have to live with the condition for the rest of their lives. The increased prevalence of T2D in children is especially devastating because the longer an individual lives with the disease, the greater the potential for developing other serious conditions associated with it, such as heart and kidney disease.

Cincinnati, Ohio has an especially high diabetes rate, and though the exact reasons for this are unclear, its high obesity rate is a likely contributor. An estimated 12.3 percent of those living in the greater Cincinnati area have diabetes, and many of them are unable to receive the care that they need to manage it.²⁵ Among these are the residents of LPH, whose diabetes rate, at 21.1 percent, is nearly double that of the rest of Cincinnati.⁵ Many of LPH’s residents are overweight or obese and suffer from co-morbidities associated with diabetes like hypertension and heart disease. As an indication of the inadequacy of the healthcare these individuals are able to receive, only 59.2 percent of those diagnosed with diabetes have had their feet checked for sores or irritations when visiting a healthcare professional.⁵ More than
67 percent of LPH residents reported having a family history of diabetes, while another 22.5 percent did not know if diabetes had occurred in their family history.⁵

All of this underscores the importance of educating people, especially minorities and those of low socioeconomic status, about diabetes and how it can be both prevented and managed. Research has clearly demonstrated that prevention is possible, and that management drastically reduces the incidence of diabetes-related complications. The NIH-funded Diabetes Prevention Program (DPP) clinical trial found that a modest weight loss of 5 to 7 percent of body weight and 30 minutes of exercise 5 times per week reduced the risk of developing T2D by 58 percent in a diverse population of over 3000 adults at high risk for diabetes.²⁶ For those who already have diabetes, clinical trials have demonstrated that controlling blood pressure and lipids may reduce diabetes-related complications by up to 50 percent.³

**Health Complications Associated With Type 2 Diabetes**

T2D is associated with a plethora of complications, including eye problems, neuropathy, skin problems, heart disease, hypertension, mental and emotional complications, hearing loss, oral health problems, gastroparesis, ketoacidosis, kidney disease, peripheral artery disease, and stroke.⁷ Vacillations in blood glucose, referred to as glycemic variability, exert a great amount of stress on the body’s vasculature, particularly within the layer of smooth muscle lining the blood vessels.¹⁶ This likely leads to many of the complications listed above, which develop as a result of impaired circulation. The best defense that a diabetic has against these conditions is close management of blood glucose aimed at minimizing glycemic variability.⁷, ⁸, ¹², ¹³
The Influence of Diet and Physical Activity on Type 2 Diabetes

Diet is considered the cornerstone of diabetes management.\textsuperscript{15,27-29} If a patient with T2D can meet his or her treatment goals, such as maintaining a HbA1c below seven percent, through diet and exercise and without the use of medication, this is certainly recommended.\textsuperscript{28} A study conducted in the UK estimated that only one third of type 2 diabetics manage their disease without medication, and it is likely that these trends are similar in the United States.\textsuperscript{30} The low success rate can likely be attributed to lack of knowledge of how diet and physical activity influence diabetes, which highlights the desperate need for nutrition education aimed at increasing awareness. The benefits of successful dietary management of T2D are apparent for the general population, however individuals in low-income populations, who most likely cannot afford medication, certainly have the most to gain from achieving glycemic control through dietary means.

The Academy of Nutrition and Dietetics highlights three major goals for diabetes management: maintain blood glucose within or as close to the normal range as possible, reduce heart disease and stroke risk, and adopt an enjoyable and doable diet and lifestyle that minimizes disease-related complications.\textsuperscript{12} As cited earlier, modest weight loss (5 to 7 percent of body weight) and moderate exercise (30 minutes 5 times per week) can drastically reduce the risk of developing T2D.\textsuperscript{26} Several studies have demonstrated that weight loss may improve insulin sensitivity in obese subjects, and this is likely one of the reasons why losing weight greatly benefits those at risk of developing T2D or those already living with the disease.\textsuperscript{31-33} Regular physical activity is recommended because research has shown that physical exertion
has an insulin-like effect, promoting the uptake of glucose into muscle cells. In fact, some studies have shown that exercise alone, independent of weight loss, improves insulin sensitivity in previously sedentary adults. Even though weight loss and physical activity exert positive effects independently, the most effective strategy involves implementing both elements into a patient’s treatment plan.

A joint position statement published by the American College of Sports Medicine and the American Diabetes Association asserts that physical activity is central to T2D management because it helps treat abnormalities in blood glucose, lipids, and blood pressure associated with the disease, and aids in weight loss and maintenance. Glucose can enter muscle cells via two distinct pathways, one of which is insulin-dependent, and the other of which is insulin-independent and induced by muscle contraction. Exercise, whether aerobic or anaerobic, stimulates glucose uptake via both mechanisms. However, by promoting the pathway not mediated by insulin, uptake of glucose into cells can carry on without hindrance in a person with T2D. Additionally, glucose uptake into muscle cells remains elevated for several hours post-exercise, providing prolonged moderation of blood glucose levels.

There is substantial debate within the field of nutrition as to the best dietary approach for weight loss and overall health in those at risk for diabetes (as well as for those in the general population). While some dietitians promote low-fat diets, others support diets that are lower in carbohydrate and higher in fat. Proponents of low-fat diets cite heart disease risk as one of the biggest reasons to minimize dietary fat, while champions of low-carbohydrate diets
argue that consuming a large percentage of calories from carbohydrate only serves to exacerbate an individual’s already impaired regulation of blood glucose.  

Though the approach currently sanctioned in the 2012 Standards of Medical Care in Diabetes, published by the American Diabetes Association, is to adjust the distribution of carbohydrate, protein, and fat “to meet the metabolic goals and individual preferences of the person with diabetes,” traditional diabetes management recommendations have called for a low-fat diet with a macronutrient distribution of approximately fifty – sixty percent of calories from carbohydrate, ten – twenty percent from protein, and no more than thirty percent from fat. More specific guidelines include minimizing saturated fat to less than seven percent of total calories, avoiding trans fats, ensuring adequate fiber intake, and including as many whole grains as possible in preference of consuming simple carbohydrates. It is commonly accepted that this balance of nutrients minimizes heart disease and cancer risk, promotes weight management, prevents incidence of hypoglycemia, and maximizes ingestion of the full array of vital micronutrients necessary for overall health.

Beyond concern for the distribution of nutrients that should be consumed, the timing of food intake is also an important element of dietary management for individuals with diabetes. In an effort to maintain blood glucose at a fairly stable level, the Academy of Nutrition and Dietetics advises planning snacks and meals at regular time intervals and eating similar amounts of food at each meal or snack. It is especially important to portion out foods that are high in carbohydrate, as these have the biggest impact on blood glucose levels. Ideally, every meal or snack should contain a combination of carbohydrate (preferably whole grain), protein,
healthy fat, so that blood glucose rises more slowly and moderately than when carbohydrate is consumed alone.\(^\text{41, 42}\) Practiced together, all of these strategies should minimize glycemic variability and reduce the risk of developing the diabetes-related complications discussed earlier.

**Theories Guiding the Development of Nutrition Education Programs**

Designing nutrition education programs involves more than simply combining creative strategies for eating more healthfully. The most successful interventions are based on careful research from which theories of cognition, motivation, and action have emerged.\(^\text{11}\) Food-related behavior, for example, runs substantially deeper than a simple choice of what to eat.\(^\text{43}\) Most of us associate certain foods with a person, place, or event, which means that the eating of that food is emotionally salient. A program participant may continue eating a food that they know is unhealthy simply because it brings back fond memories of childhood cooking sessions with grandma, or because it is an integral part of his or her culture.\(^\text{43}\) Nutrition educators must acknowledge and be sensitive to participants’ various reasons for food-related behaviors, and it is only in addressing these underlying factors that true change can be accomplished.

One of the most important aspects of program design is a thorough understanding of the intervention’s target audience, which allows that group’s specific needs and concerns to be addressed. Working with low income populations, for example, brings with it certain special considerations. Individuals of low socioeconomic status often feel a lack of control over their environment. If those planning the intervention barge into such a community without involving community members in the planning process, program participants are likely to feel alienated
and misunderstood, and they are unlikely to derive much from the intervention. One of the best practices is a community-based approach, in which members of the target audience are directly involved in the development process. This approach establishes a relationship of trust, openness, and respect between those delivering the program and those receiving it. Utilizing this approach isn’t always easy, because it requires program designers to relinquish some control over what materials are covered and how the program is run, and there is no guarantee that yielding to audience members’ requests will produce the outcomes desired. But, the increased receptivity that usually accompanies consensus should outweigh any loss of control that may have been incurred.

In the field of nutrition, many effective interventions have been based on the Social Cognitive Theory (SCT), which proposes that “behavior is the result of personal, behavioral, and environmental factors that influence each other in a dynamic and reciprocal fashion.”

Personal factors refer to an individual’s thoughts and feelings. Behavioral factors involve food-, nutrition-, and health-related knowledge and skills (referred to as behavioral capability) and skills in regulating and taking charge of behaviors (referred to as self-regulation skills). Lastly, environmental factors pertain to influences that are external to a person, such as one’s physical and social environments. This multi-pronged approach is one of the most widely used in nutrition education because of its direct address of such a wide range of influences over behavior.

SCT predicates that individuals are shaped by their environments, but that they also have some control over both their environment and their behavior because they are able to
self-reflect and self-regulate. Much of behavior is driven by our expectations of the outcome (i.e. \textit{outcome expectations}) and our beliefs in our ability to succeed in a particular skill or behavior (i.e. \textit{self-efficacy}). If we do not believe that losing excess weight will improve our health and reduce our disease risk, we will harbor little motivation and expend little effort to lose weight. However, if we feel assured that our health will improve with weight loss, we will be much more eager and willing to do the work necessary to lose weight. On the other hand, we may believe that weight loss would be beneficial, but if we don’t feel capable of achieving it, we are very unlikely to attempt to do so.

This means that nutrition education programs must equip participants with knowledge of what to do, instruction in how to do it, and reassurance of the positive outcomes they will experience as a result. Participants must leave an intervention with confidence that they \textit{can} improve their health by incorporating what they have learned into their lives. One of the best methods of instilling positive outcome expectations and self-efficacy is \textit{learning by doing}.\textsuperscript{11} Engaging participants in an interactive class format—where they not only hear about what they should do, but can also smell, feel, taste, and discuss—enables them to gain the behavioral capability necessary for behavior change.

\textbf{Characteristics of Appalachian Populations and the Urban Appalachians of LPH}

Appalachia comprises a 205,000-square-mile area that includes counties in Mississippi, Alabama, Georgia, North and South Carolina, Virginia, West Virginia, Maryland, Pennsylvania, New York, Tennessee, Kentucky, and Ohio.\textsuperscript{1,44} It is divided into three major subregions—Northern, Central, and Southern—and includes a vast array of topographies, economies,
ethnicities, population densities, social norms, and health risks.\textsuperscript{1,44} Many of the populations now referred to as urban Appalachian migrated out of rural Appalachia during the Great Migration that took place in the twentieth century.\textsuperscript{1,45} Though they have held on to many regional traditions by maintaining strong kinship networks, urban Appalachians have also had to adjust to face the novel challenges presented by the urban environment.

Diabetes prevalence is higher in Appalachian populations than it is in other demographic groups.\textsuperscript{1,46} Appalachian Ohio appears to be especially hard hit, as demonstrated by a 2009 study of eleven Appalachian counties in Ohio that reported a diabetes rate of 12.5 percent, in comparison with 7.8 percent for non-Appalachian Ohio and 7.2 percent for the entire nation.\textsuperscript{1,47} As if this high disease rate were not devastating enough, another study conducted in 2008 revealed that 49.2 percent of individuals diagnosed with diabetes in nine Appalachian Ohio counties were less than forty years of age.\textsuperscript{1,48} These sobering statistics of diabetes among younger individuals suggest that the high disease prevalence we are seeing now represents a fraction of what we can expect to see in the years to come.

One group of Appalachian migrants resides in LPH, an urban center on Cincinnati, Ohio’s near west side. This close-knit community is comprised of mostly Caucasians, many of whom are low-income. Fifty-six percent of LPH residents live below the poverty line, and many rely on federal assistance (such as the Supplemental Nutrition Assistance Program [SNAP]) to feed and provide for their families.\textsuperscript{5} Unemployment in LPH stands at sixteen percent, and the jobless rate—which includes students, the retired, and the unemployed—is 50 percent.\textsuperscript{5} Sixty-two
percent of residents over the age of twenty-one do not have a high school diploma, and forty-nine percent of households consist of females with children.

In addition to low socioeconomic status, LPH residents face many health concerns. The LPH Health Initiative estimates that 35 percent of community members have fair/poor health status, 72.5 percent are overweight or obese, and 26.3 percent are at risk for food insecurity. More than 67 percent of these residents have a family history of diabetes, and an additional 22.5 percent do not know whether or not diabetes runs in their family. The individuals of LPH struggle under a staggering T2D rate of 21.1 percent. Many of the factors highlighted above likely contribute to this high disease prevalence. Dietary patterns that have been passed down for many generations are also likely contenders.

The traditional Appalachian diet is wrought with disease-promoting foods and food preparation methods that expectedly contribute to both obesity and diabetes risk. Fried foods, for example, most often cooked in a vat of lard, are a heavily-relied upon favorite dripping in saturated fat. If fried foods weren’t enough on their own, many other fare, such as vegetables, beans, and soups, are boiled with a sizeable piece of fatty pork and a dose of sugar swimming in the pot. Many of the Appalachians’ favorite foods have arisen out of the context of daily hard physical labor in an unforgiving hot and humid climate (at least during the summer months). Frying was faster than other cooking techniques, it spared use of an oven which would heat up the entire house (there was no way to cool it down again prior to the advent of air conditioning), and it allowed for a highly satiating meal that provided the necessary energy for sustained manual work. Similarly, ice-cold sugar-laden coca colas and iced teas offered a
refreshing reprieve from the dry heat of the scorching sun, and nothing could be better as a reward for a hard day’s labor than a sweet apple pie or fruit cobbler.\textsuperscript{4,43} With this backdrop, the Appalachians’ traditional food choices make sense, and the constant physical activity of the past allowed most of the population to escape the clutches of disease.

Among other factors, migration into urban centers drastically shifted the balance. Financial strain necessitating the entry of both parents into the workforce, and/or the hindrances of physical disability mean that traditional home-cooked meals have largely been replaced by fast food and heavily-processed convenience foods.\textsuperscript{4} Physical activity has been swapped for sedentary pursuits, not only because of increased access to television, computers, and video games, but also because the high crime rates characteristic of many urban areas can make it unsafe to exercise.\textsuperscript{4} It almost goes without saying that continuing to eat a high-fat and high-sugar diet without regular vigorous physical activity has contributed to urban Appalachians’ skyrocketing rates of obesity and T2D.

Due to both financial constraints and in some cases the inaccessibility of care (i.e. transportation limitations), many individuals of Appalachian descent do not receive the health care and education in diabetes management that they need.\textsuperscript{1} One individual participating in an environmental scan\textsuperscript{1} noted, “‘Oftentimes, patients are newly diagnosed with type 2 diabetes, given a prescription for medications or insulin, and sent home with little or no education. Many patients have the misconception that if they ‘stay away from sweets’ they are managing their disease.’”\textsuperscript{1} While avoiding a large amount of sugar is certainly important, there is a great deal

\footnotetext{1 An environmental scan is a survey method that employs a variety of techniques in order to examine the scope of a problem from a variety of perspectives.}
more to diabetes management, and patients living with the disease need more than a bottle of pills. As helpful as pharmaceuticals can be, self-management—through diet and exercise—is paramount to keeping diabetes in check and preventing complications from arising.

Any intervention aimed at the urban Appalachians of LPH would have to take all of the characteristics discussed in this section into consideration, and this is the approach taken in designing the LPH Nutrition Education Program. The purpose was to provide a clear, engaging, fun, interactive, and accessible program that could be understood by individuals of many levels of educational attainment. It was important that the program honored Appalachian tradition and acknowledged the constraints of a low-income urban environment, while at the same time encouraging positive behavioral change. The remainder of this thesis describes the content and structure of the LPH Nutrition Education Program and details the LPH residents’ response to the program.

**Methods**

*Rationale for LPH Nutrition Education Program Structure and Content*

The development of the LPH Nutrition Education Program served as the third phase of the multi-part LPH Diabetes Initiative mentioned earlier in this thesis. Phase I of the initiative involved the training of Community Health Advocates (CHAs). In Phase II, the trained CHAs surveyed the residents of LPH to collect health-related data, as described previously. Both Phase I and Phase II were undertaken by the UAC, prior to the involvement of the University of Cincinnati. Nutrition educators at UC utilized the information collected by the UAC during the
program development process, and the following text describes how some of this information guided the program’s design.

One of the first steps in program development was to gather knowledge from and about Appalachian migrants in general, and those residing in LPH specifically. Robert Ludke and Phillip Obermiller’s extensive compilation of research on Appalachian populations, recorded in *Appalachian Health and Well-Being*, provided an excellent backdrop to the unique characteristics of and issues facing Appalachians and urban Appalachian migrants.¹

*Appalachian Health and Well-Being* documents the regional health issues afflicting urban Appalachians, the barriers they face in obtaining healthcare, the influences of culture, community, and poverty on their health, and provides strategies for effectively improving the health of this group of people. A great deal of health-related research has been undertaken in this population, and this certainly informed our understanding of the target audience.

The next step involved gathering in depth information about the specific group of urban Appalachians living in LPH. Nutrition professionals at the University of Cincinnati collaborated with the UAC, a community-based non-profit organization established to assist Appalachian migrants residing in LPH. Beginning in March 2009 and concluding in March 2012, the UAC engaged in the LPH Diabetes Initiative, a participatory research project aimed at identifying individuals at high risk for diabetes, educating community members about the risks and symptoms of diabetes, encouraging at-risk individuals to get screened for diabetes, and providing the necessary resources for screening and referrals.⁵ Through this initiative, in which
the UAC reached out to over 400 households in the LPH community and completed interviews with 229 households, a vast revenue of health-related information was collected.

In addition to providing health data, the LPH Diabetes Initiative included the training of a group of Community Health Advocates (CHAs), individuals who are themselves members of the LPH community, but who serve to monitor the needs and concerns of LPH residents and strive to provide for those needs. At the conclusion of Phase II of the LPH Diabetes Initiative, community members were informed of the research results and encouraged to provide feedback concerning effective interventions that could help reduce diabetes risk. Residents of LPH recommended education in diabetes risk and management, nutrition and healthy cooking classes, fitness programming and walking clubs, and financial assistance for healthcare.5

By utilizing the research conducted by the UAC and communicating directly with the CHAs, the UC nutrition professionals were able to employ a community-based approach for Phase III of the LPH Diabetes Initiative—the development of the LPH Nutrition Education Program. During the development process, several meetings were held with UAC members and CHAs, allowing for continual feedback. For example, as course topics and/or recipes were proposed by UC nutrition educators, LPH community members were able to request the inclusion of pertinent topics or suggest alternative recipes that might be better accepted. As such, community members were involved in every aspect of the planning process, and we strongly believe that the resultant program effectively addresses LPH residents’ express needs and concerns.
The LPH Nutrition Education program delivered to the Urban Appalachian migrants of LPH was designed in accordance with many of the principles discussed in the section *Theories Guiding the Development of Nutrition Education Programs*. Built on a foundation of the tenets of SCT, this intervention sought to address the complex and multitudinous factors that affect nutrition- and health-related behaviors. We determined that the LPH Nutrition Education Program needed to include components of knowledge dissemination, demonstration of how to implement this knowledge, and reassurance of participants’ ability to achieve success. This was based on SCT’s guidelines that behavior is influenced by personal, behavioral, and environmental factors, and that *self-regulation* and *self-efficacy* are potent mediators of behavior.\(^{11}\)

One of the primary components of the LPH Nutrition Education Program was a food tracking workshop. Research suggests that developing self-awareness through tracking food- and exercise-related behaviors has a substantial effect on dietary improvement and weight loss success.\(^{11}\) It was reasoned that, by recording their intake, participants would become more aware of their personal habits, and that the nutrition educators could use this information to provide feedback pertaining to positive behaviors already taking place and suggestions for the improvement of less-desirable behaviors. In addition, fostering the development of self-regulation skills would enable participants to continue evaluating their progress and making beneficial changes long after the intervention’s end.

The second component of the program involved interactive instruction (approximately thirty minutes in length). Since it was expected that many of the participants would have lower
levels of educational attainment, material was designed to be delivered in a clear and easy-to-follow format that included many practical examples for participants to relate to. Based on conversations held with CHAs and community members’ demonstrated friendliness and talkativeness during the program development process, we anticipated that discussion would be an integral part of the educational process and made sure to keep instructional material interactive. A handful of short, engaging video clips were built in to many of the classes in order to provide a concise and visually-stimulating summary of key concepts, such as healthy grocery shopping tips and advice for eating out wisely. Many of the class sessions also contained an interactive activity, such as a nutrition label reading exercise, that enabled participants to put learned principles into practice. Equipping participants with knowledge and how-to strategies was expected to enhance both awareness of the diet-health relationship and the behavioral capability of this community.

Since research has demonstrated the effectiveness of a learning by doing approach, it seemed necessary to include a cooking and tasting segment in each class session. Involving participants in the preparation of healthy foods builds behavioral capability and self-efficacy. Participants learn not only how to act on the knowledge they’ve gained, but they also obtain experiential proof that healthy cooking and eating can be easy, satisfying, and enjoyable. Recipes chosen for each class session were directly related to the day’s class topic, therefore providing an explicit demonstration of the principles addressed. If the class objectives called for, say, decreasing fat and increasing fruits and vegetables, both of these goals were supported by making a fruit and yogurt parfait that used low-fat yogurt and a mixture of berries.
LPH Nutrition Education Program Trial

A trial run of the LPH Nutrition Education Program was delivered to a group of approximately thirteen urban Appalachian individuals during the Fall of 2012. One 90 – 120 minute class per week was taught for eight weeks. The exact amount of time for each segment varied based on informational content and the amount of time needed for cooking. The trial run enabled UC Nutrition Educators to adjust to the limitations of the available facility, a community church located in LPH, and to improve the content and effectiveness of the classes based on participant feedback.

The participants’ feedback from the trial run was incorporated into the LPH Nutrition Education Program prior to the implementation of the first session. Based on participants’ desire for even more interaction, it was decided to place the food tracking workshop at the beginning of every class to ensure that there would be adequate time for answering individual questions. Recipes that were unappealing to participants were replaced with more familiar (but still healthy) recipes that more closely match the traditional Appalachian diet. Course content was also adjusted to include some of the topics that participants had requested.

Course Content

The LPH Nutrition Education Program consists of eight sessions. The first and last sessions do not include an instructional component, but rather serve to explain, administer and collect the program assessments. Each of the remaining six classes were designed to target the major tenets of diabetes self-management: eating a healthy diet, engaging in regular physical activity, and maintaining a healthy weight. A brief description of each class follows:
Class 1: Diabetes Awareness and Self-Awareness

This class begins with an overview of what T2D is, what increases diabetes risk, and what complications are associated with uncontrolled diabetes. Participants learn that healthy changes must be made gradually, by setting and achieving obtainable goals, and that becoming aware of their own behavior will greatly enhance their chances of success. In this session, participants begin the process of building self-awareness by filling out a 24 hour food and exercise log, which will be repeated throughout the program. Discussion about how to read nutrition labels and how to find the healthiest foods at the grocery store is included. The cooking activity reinforces the message of making small changes by giving participants the opportunity to taste some healthier snack foods. Replacing unhealthy snacks with more nutritious snacks is an easy step in the right direction.


Since carbohydrates have the biggest impact on a diabetic’s blood sugar, this class teaches participants a great deal about this powerful macronutrient. Participants learn what carbohydrates are, which foods contain carbohydrates, how carbohydrates impact blood sugar, and how to differentiate between unhealthy refined carbs and healthy complex carbohydrates. Nutrition Educators stress the importance of striving to replace refined carbohydrates in the diet with whole grains, and emphasize the benefits of distributing carbohydrate intake evenly throughout the day. The cooking activity allows participants to try some whole grains—whole wheat pasta and bulgur wheat—in order to encourage their consumption.

Class 3: How to Eat and Live Heart Healthy
One of the key principles of decreasing heart disease risk involves lowering fat intake (especially saturated fat). This class focuses on choosing foods that are naturally lower in fat and avoiding extra fat by using low-fat food preparation methods. Participants learn about the risks of consuming too much dietary fat and what steps they can take to lower their fat intake. Instead of turning to fat, participants are encouraged to use herbs and spices to boost a dish’s flavor. The cooking activity reinforces this principle using low-fat Jerk Chicken Casserole and low-fat Apple Cobbler recipes, both of which pack a powerful flavor punch while maintaining their healthfulness.

Class 4: The Importance of Fruits and Vegetables

Fruits and vegetables are incredibly healthy and extremely versatile, but the American diet is typically lacking in these food groups. This class highlights the importance of including fruits and vegetables in the diet and provides strategies for increasing fruit and vegetable intake. Participants learn about the powerful nutrients that make fruits and vegetables so healthy, how including fruits and vegetables helps individuals to achieve a well-balanced diet, and strategies for increasing fruits and vegetables in the diet. For example, replacing unhealthy snacks with fruits and vegetables increases the amount of nutrients one consumes and automatically leads to lower fat intake—two major benefits from one small change. The cooking session demonstrates creative ways to add fruits and vegetables to meals and to the diet with delicious fruit smoothies and a vegetable-rich stir fry.

Class 5: Holidays and Eating Out Wisely
Holidays and celebrations are some of the hardest events to get through when trying to eat more healthfully. This class discusses how to enjoy holidays and celebrations while still maintaining a healthy diet. One way that this can be accomplished is through meal planning. Participants are taught that it is important to think about how each food affects the overall diet; for example, if someone knows that he/she wants to enjoy a piece of cake or pie, then it is best to prepare for that treat by keeping the rest of the day’s food choices healthy and eating an appropriate portion size of that treat.

Busy lifestyles demand fast and convenient meals, which means that lunch and dinner are often of the fast food variety. Although home-cooked meals are recommended over fast food, it is recognized that this is not always possible. Therefore, the program emphasizes strategies for choosing healthier options when eating out at restaurants and fast food vendors. During this class, participants learn how to evaluate a restaurant’s menu choices and how to choose healthier options. It is also recognized that people sometimes choose fast food simply because they enjoy the taste of the foods offered at those restaurants. Accordingly, this session’s cooking activity demonstrates fast, easy, and healthy recipes that are similar to fast food fare, but much healthier.

*Class 6: Meal Planning and Physical Activity*

During this session, the concept of meal planning is revisited, in the context of balancing calories in with calories out. One of the key tenets of diabetes management highlighted in this class is the importance of physical activity. In addition to covering guidelines for the amount of exercise one should strive for, activity suggestions are provided that people of all ages and
physical abilities can do. It is also emphasized that physical activity can be incorporated into one’s lifestyle in a variety of creative ways, from walking, to cleaning the house, to playing with one’s children.

**LPH Nutrition Education Program Delivery**

The first session of the LPH Nutrition Education Program was delivered from January – March of 2013. At the first class, participants consented to the release of their feedback for use in program development and publication. Participants also completed a Nutrition Knowledge and Beliefs Questionnaire (developed by the UC Nutrition Educators), Block Fruit and Vegetable Screeners, and Block Fat Screeners. The same measurement tools were administered to participants at the program’s final session, along with a Program Process Questionnaire used to assess participants’ acceptance of and thoughts pertaining to the course.

In order to provide better one-on-one feedback to each participant, each class began with a 10-15 minute food tracking workshop. During this time, each participant filled out a 24 hour food log, and nutrition educators checked in with participants to see how they were doing and to answer their questions and concerns. This was followed by a thirty – forty-five minute instructional segment, aided by Microsoft Powerpoint presentation. Instruction was conducted in a combined lecture and interactive discussion format, during which participants were encouraged to provide feedback and ask questions. Many of the classes included short video clips that summarized important lessons and hands-on activities such as Nutrition Label reading. After this, participants joined in on a brief cooking demonstration, which reiterated the day’s key concepts and highlighted healthy cooking techniques. Participants were able to
taste all of the food prepared during the session, and were encouraged to think about how they could prepare some of their favorite foods in a similar fashion.

Dietary changes and changes in knowledge and behavior were evaluated by comparing the average score of all participants (n = 16) on each assessment administered pre-intervention with the average score of all participants on each assessment administered post-intervention. Statistical significance was calculated using a paired samples t-test with alpha set at p < 0.05.

Results

Participants

Sixteen individuals from the LPH urban Appalachian community were enrolled in the first two sessions of the LPH Nutrition Education Program. Community members who were identified as having a high risk of developing T2D, as well as those already living with T2D were invited to participate. Approximately 87 percent of the participants were non-Hispanic white, and 13 percent were African American. Most of the participants were female.

Outcomes

At the completion of two sessions (n=16 participants) of the LPH Nutrition Education Program, based on results from the Program Process Questionnaire, feedback was very positive, indicating that participants enjoyed the classes, learned a great deal from them, felt more knowledgeable about diabetes and how it can be prevented and managed, and gained encouragement and a sense of hopefulness in their ability to care for themselves and their families. Participants expressed that they liked the way the classes were structured, providing
instructional content, opportunities for discussion, and hands-on activities that made concepts easier to understand. Participants appreciated learning about their health, the factors that contribute to diabetes risk and strategies for lowering diabetes risk, and methods for managing T2D with nutrition and exercise. In addition to participants’ positive evaluation of program content, many individuals also noted that they were pleased with the clarity of the information presented and the manner in which the nutrition educators approached participants. In summary of the sentiment expressed by several participants, one individual stated, “I really enjoyed all of the classes and the people. The classes were very informative and the atmosphere was always very friendly and upbeat.” A table listing participants’ comments can be found in Appendix 1.

In addition to providing open-ended feedback on the Program Process Questionnaire, participants were given the opportunity to rate each class and each recipe individually on a scale of 1 to 7, where 1 = liked the most and 7 = liked the least. Thirteen out of the fourteen participants rated all of the classes with a score of 1 or 2, indicating a high level of acceptance of the program. Of the eighteen recipes prepared during the program, participants consistently rated all but one of them favorably (the tabouli), with the exception of five lower rating due to an individual’s personal dislike of a particular food item or ingredient. A few participants commented that they would have liked to have had an even larger number of traditional Appalachian recipes included in the program. Participants were also given the option of rating the helpfulness of specific skills taught during the program, with a score of 1 indicating “most helpful,” and a score of 7 indicating “least helpful.” Once again, participants rated nearly all of the seven skills (“keeping a food record,” “recording steps with a pedometer,” “meal planning
with carbohydrates,” “label reading,” “comparing products for fat,” “comparing products for calories,” and “cooking”) with scores between 1-3, implying that the skills included in the program were considered useful. Two participants rated “recording steps with a pedometer” and “cooking” with a score of 7, noting that they did not find the pedometer helpful because they never used it, or that cooking was not helpful because they do not cook or enjoy cooking.

When asked what other skills or information participants would have liked to learn about, individuals cited the following:

“I need more information about physical activity that can be done at home.”

“You did not give us enough information about how to lose weight.”

“I would like more information about how to feed a family on a SNAP budget and how to get motivation to exercise.”

“I would like to have more focus on the impact of pre-packaged meals. Also, a series for young mothers so that young children can start out without Kool-Aid and soda pop in the bottles and super sugary cereals in their breakfast and snack bowls.”

Most of these responses were expressed by a single participant rather than a majority of program participants. However, several individuals did indicate a need for help with teaching children to eat healthier and help with feeding a family on a constricted budget.

Several participants noted positive behavior changes in response to concepts learned throughout the program. Participant feedback on Program Process Questionnaires included comments such as, “This program has helped me to eat better,” “the program helped me to
include more vegetables in my meals," and “I never realized how unhealthy the foods that I chose at restaurants were.” Dietary changes were noted among the participants in session 1 (n = 9) with a significant decrease in intake of high fat foods from pre to post intervention (p = 0.02), and a trend for a significant increase in fruits and vegetables (p = 0.09). Diabetes-related nutrition knowledge did not change significantly in either session. A table with participants’ scores on each assessment can be found in Appendix 2.

**Discussion**

After taking the feedback provided by participants into consideration, it appears that the LPH Nutrition Education Program was well accepted by members of the LPH community. Overall, participants were highly satisfied with the content, structure, and delivery of the program and felt that they had gained valuable knowledge and confidence that would improve the lives of both themselves and their families. None of the feedback received was of a negative nature, and, other than requests for the inclusion of additional information, participants consistently noted that they thoroughly enjoyed every aspect of the program. The community-based approach taken in developing the LPH Nutrition Education Program likely contributed to participants’ acceptance of the program. By gathering input from members of the LPH community, a program was successfully developed that was based on the specific concerns and characteristics of this urban Appalachian population.

In addition, the structural design of the classes—which included a PowerPoint-assisted instructional segment, opportunities for discussion, hands-on activities, and cooking and tasting components—likely added to the acceptability of the program. The members of the LPH
community were friendly, talkative, and dedicated to maintaining a close camaraderie. By including participants in class discussions and encouraging and listening to their feedback, participants felt valued by the nutrition educators and warmly welcomed them into the community. It was noted that the more participants were able to engage in discussion, the more excited they became about class material.

The LPH Nutrition Education program met with a handful of difficulties that tend to commonly plague community interventions. To begin with, the small number of total participants (n = 16) made it difficult to achieve statistical power, and this may have prevented us from reaching statistically significant results in some of the areas measured. Participants who only attended a few sessions or who did not complete the assessments were excluded from analysis, thereby decreasing the number of participants we could draw from. We also found it difficult to control for a participants’ occasional absence from class. For example, a participants’ score on the Nutrition Knowledge Questionnaire may have increased from pre-intervention to post-intervention if they had not missed a class, especially if the missed class contained material that the participant was particularly unfamiliar with. Finally, we noted that it was sometimes a challenge keeping everyone focused on the same material. Encouraging participant feedback during class sometimes resulted in the development of multiple conversations occurring simultaneously. In such instances, some participants may have missed out on pertinent information that would have increased their knowledge.

Anecdotally, a majority of the individuals who completed the program expressed that afterwards, they understood diabetes better than before and that they felt well-equipped to
prevent and/or manage the disease. Interestingly, the participants’ nutrition knowledge from pre- to post-intervention, as assessed by a Nutrition Knowledge Questionnaire, did not improve significantly. This could possibly be explained by the low educational attainment of many members of the LPH community, which could make it difficult for some participants to understand or remember some of the program’s concepts. However, another explanation could be that since the Nutrition Knowledge Questionnaire focused on specific facts, such as “what makes complex carbohydrates/whole grains healthier than simple carbohydrates,” rather than general concepts, participants may have absorbed general strategies for eating healthier, but not specific details. For example, participants may understand that they should choose complex carbohydrates/whole grains instead of simple carbohydrates, and know how to find whole grain products at the grocery store, but they may not remember that these foods are healthier because they contain more fiber, vitamins, and minerals. This would explain why participants could feel that they learned a lot without their nutrition knowledge scores increasing. From a practical application standpoint, it makes sense that participants would focus more on the overarching principle or action that they need to take than the seemingly inconsequential details of why. Perhaps the addition of questions that focus more on general concepts rather than specific facts would provide a better measure of participant’s change in pre- and post-intervention knowledge.

In contrast to this potential explanation, we also observed that some participants earned high scores on the pre-intervention Nutrition Knowledge Questionnaire. Therefore, an alternative explanation to the questionnaire being too specific could be that it was actually too easy (for at least some participants), and that statistical significance was not reached because
of a ceiling effect. Regardless of which hypothesis more accurately explains the results, further development of the program, a larger participant pool, and perhaps the inclusion of general concept questions (or more difficult questions) on the Nutrition Knowledge Questionnaire, we anticipate seeing significant changes in nutrition knowledge in future administrations of the program.

In contrast to the insignificant changes mentioned above, a significant reduction in the consumption of high-fat foods was observed in the session one participants. Many participants expressed surprise to learn how much fat can be hidden in certain foods, and how much of a difference small changes can make. Since the Appalachian diet is characteristically high in fat, modification of fat intake is one of the most important aspects of the diet to address. The program targeted dietary fat reduction from several angles, including replacing high-fat foods with low-fat foods, low-fat cooking techniques, substituting full-fat ingredients with low-fat alternatives, and reducing the portion size of higher-fat food items.

The concepts of reducing fat intake taught during the program may have been most aided by the cooking and tasting sessions, because participants were able to disprove their preconceived notions that low-fat foods taste bad. Many of the participants were pleasantly surprised by how much they liked foods prepared in low-fat ways and using low-fat ingredients, and they noted an eagerness to incorporate these items into their diets. Once they were able to see firsthand that reducing fat does not automatically mean having to reduce flavor and palatability, the idea of lowering fat intake no longer seemed akin to suffering.
A trend toward an increase in fruit and vegetable intake was also observed among session one participants. Although this observation was not statistically significant, it was encouraging to see at least some evidence of change taking place. Throughout the program, we did emphasize making gradual changes, and because of this emphasis, it might be reasonable to expect that participants intend to increase their fruit and vegetable intake, but that they have not made sufficient progress in doing so at the time of measurement. We considered that it may be beneficial to add an assessment of fruit and vegetable intake some time after the conclusion of the program in order to determine if participants are in fact making significant changes that we simply failed to capture. In addition to this, financial constraints may have prevented some individuals from incorporating more fruits and vegetables into their diet, providing another explanation for the insignificant results.

Since a majority of the topics or skills listed by participants as “other skills or information I would like to have learned” were addressed at least briefly during the program, we believe that these responses were likely expressed by an individual struggling with the particular concern mentioned who desired more in-depth instruction on that topic. One strategy for improving program effectiveness would be to include additional time, personnel, and/or resources to participants who express the need for help with a specific question or concern. Although participants were asked at the beginning of each session if there were particular topics they would like incorporated into the program, they may have forgotten to mention some of their concerns either due to being distracted by the suggestions of other participants, or due to lack of sufficient time to consider their needs. Perhaps conducting a more formal interview process with each
participant at the beginning of a program session would provide a better opportunity for assessing and addressing each individual’s needs and concerns.

Other skills or information listed in this feedback section were topics that not addressed during the program due to time constraints. Several participants expressed a need for more information about convincing children to eat healthier as well as strategies for feeding a family on a limited budget. The essentiality of this information is well understood, and future administrations of the program will certainly include more information of this sort. Some participants suggested providing a separate program targeted at mothers and their children to address these concerns, and this may be the best strategy for this particular group of individuals. Because the LPH Nutrition Education Program seeks to minister to a broad spectrum of the members of the LPH community, it is difficult to thoroughly address the needs of particular groups within the community. By providing a separate session or program targeted at mothers and their children, the issues that they struggle with could be focused on specifically.

Conclusion

The results of the LPH Nutrition Education Program, although preliminary, suggest that this UC-UAC collaborative diabetes prevention initiative in LPH may provide a useful approach to improving diet quality among urban Appalachians at high risk of developing T2D. Due to the program’s wide acceptability and modest effectiveness in bringing about changes in diet and behavior, it is anticipated that with further development of the program and a larger participant pool, significant changes will be seen in both nutrition knowledge and fruit and
vegetable intake in future administrations of the program accompanying the significant reduction in intake of high-fat foods already observed. The LPH Nutrition Education program was appropriate for its target audience, met its intended objectives, and could potentially be utilized in other populations with characteristics similar to those of this urban Appalachian population.
## Appendix 1

### Table 1A: LPH Nutrition Education Program Summary of Qualitative Feedback, Program Trial

<table>
<thead>
<tr>
<th>Program Trial</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Comments</strong></td>
</tr>
<tr>
<td>“I like everything about the classes.”</td>
</tr>
<tr>
<td>“I like how we learn about our health.”</td>
</tr>
<tr>
<td>“I needed to learn about how to not eat fattening foods. I know now how to eat healthy foods in order to not develop diabetes.”</td>
</tr>
<tr>
<td>“I like how the instructors talked to us.”</td>
</tr>
<tr>
<td>“The program was easy to understand and taught us about different kinds of foods. It taught us what foods will help us and what foods will not help us.”</td>
</tr>
<tr>
<td>“I enjoyed all the classes.”</td>
</tr>
<tr>
<td>“I liked the tasting part of the program the best. I would like to have more discussion in the program.”</td>
</tr>
<tr>
<td>“I never really realized how unhealthy the foods that I chose at restaurants were.”</td>
</tr>
<tr>
<td>“I really enjoyed all of the classes and the people. The classes were very informative and the atmosphere was always very friendly and upbeat.”</td>
</tr>
<tr>
<td>“I like how they broke everything down into clear terms.”</td>
</tr>
<tr>
<td>“The program helped me to include more vegetables in my meals.”</td>
</tr>
<tr>
<td>“I really liked everything. I like the interaction, how some of it was slides and then some of it was hands-on.”</td>
</tr>
<tr>
<td><strong>Suggestions for Improvement</strong></td>
</tr>
<tr>
<td>“I would like it if you would make a diabetes cookbook.”</td>
</tr>
<tr>
<td>“I would like more information about how to feed a family on a SNAP budget and how to get motivation to exercise.”</td>
</tr>
<tr>
<td>“Did not give us enough information about how to lose weight.”</td>
</tr>
<tr>
<td>“Good program. Need more information about different [physical] activities that you can do at home.”</td>
</tr>
<tr>
<td>“I would like to have more focus on the impact of pre-packaged meals. Also, a series for young mothers so that young children can start out without Kool-Aid and soda pop in the bottles and super sugary cereals in their breakfast and snack bowls.”</td>
</tr>
<tr>
<td>“The “modernity” of some of the recipes did not seem to recognize the cooking traditions of Appalachian peoples. Beans are a staple for us; a meal with beans flavored with turkey vs. pork would have been good.”</td>
</tr>
<tr>
<td>“The slides in the packet are too small to read.”</td>
</tr>
</tbody>
</table>
Table 1B: LPH Nutrition Education Program Summary of Qualitative Feedback, Session 1

<table>
<thead>
<tr>
<th>Session 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Comments</strong></td>
</tr>
<tr>
<td>&quot;I liked everything about the program.&quot;</td>
</tr>
<tr>
<td>&quot;I enjoyed meeting different kinds of people and learning a healthy way of cooking. Also, learning how to exercise.&quot;</td>
</tr>
<tr>
<td>&quot;They help me to eat better.&quot;</td>
</tr>
<tr>
<td>&quot;I liked the speakers the most. I think you did a great job.&quot;</td>
</tr>
<tr>
<td><strong>Suggestions for Improvement</strong></td>
</tr>
<tr>
<td>&quot;I would like to learn more about insulin.&quot;</td>
</tr>
<tr>
<td>&quot;Tell me how to not eat late at night.&quot;</td>
</tr>
<tr>
<td>&quot;I did not like the brown rice.&quot;</td>
</tr>
<tr>
<td>&quot;I feel I eat healthier when we have class because it reminds me. Could I have a chart to put on the fridge?&quot;</td>
</tr>
<tr>
<td>&quot;I would have liked more ideas for kids, and how to get them to eat healthy.&quot;</td>
</tr>
</tbody>
</table>
Appendix 2

Table 2: LPH Nutrition Education Program Pre-and Post-intervention Assessment Scores

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Pre-Intervention</th>
<th>Post-Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nutrition Questionnaire</td>
<td>Block Fat Screener</td>
</tr>
<tr>
<td><strong>Program Trial</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>11.0</td>
<td>23.2</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>4.0</td>
<td>11.5</td>
</tr>
<tr>
<td>Low Score</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>High Score</td>
<td>16</td>
<td>46</td>
</tr>
<tr>
<td><strong>Session 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>12.5</td>
<td>34.3</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>5</td>
<td>10.9</td>
</tr>
<tr>
<td>Low Score</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>High Score</td>
<td>16</td>
<td>44</td>
</tr>
<tr>
<td><strong>Session 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>14.3</td>
<td>21.5</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.5</td>
<td>14.2</td>
</tr>
<tr>
<td>Low Score</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>High Score</td>
<td>15</td>
<td>41</td>
</tr>
<tr>
<td><strong>Combined</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>13.0</td>
<td>24.0</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>4.3</td>
<td>12</td>
</tr>
<tr>
<td>Low Score</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>High Score</td>
<td>16</td>
<td>46</td>
</tr>
</tbody>
</table>

Note: A higher score on the Block Fat Screener indicates a higher intake of high-fat items.
Bibliography


18. American Diabetes Association. Diabetes Basics. Available at: 

19. WebMD. Symptoms of Type 2 Diabetes. Available at:


22. American Diabetes Association. Diabetes Statistics. Available at:

23. American Diabetes Association. Prediabetes. Available at:

24. Centers for Disease Control. 2007 National Diabetes Fact Sheet. Available at:

25. Cincinnati Diabetes and Obesity Center. About Us. Available at:


