CHAPTER 1

Introduction

The incidence of type 2 diabetes has greatly increased in the U.S. population over the last decade and continues to increase each year. Over 90% of those with diabetes have type 2 diabetes, for which obesity, diet, and inadequate physical activity are strong risk factors (1). From 1990 to 1998 there was an increase in the prevalence of type 2 diabetes across all socioeconomic classes for both men and women (2). Populations that are at greatest risk are African Americans, Hispanics, and Native Americans. The greatest increase in the prevalence of diabetes has been among those with more education and who are between the ages of 30-39 years. There is more awareness now about diabetes, so the increased incidence rate could be a direct effect of this heightened awareness having resulted in more people being tested. In Virginia between 1994 and 1996, the estimated number of people with diagnosed diabetes was 220,000. However, another 75, 000 were estimated to have the disease, but did not know it (3).

Although family history increases an individual's risk of type 2 diabetes, there is strong evidence that modifiable risk factors such as obesity and physical inactivity are the main non-genetic determinants of the disease. An estimated 26% of American adults are obese, based on a BMI of 30.0 or greater. There has been a 61% increase in the rate of obesity since 1991 (4), which may partially explain the increase in diabetes. Obesity is a main contributor to impaired glucose tolerance (IGT), insulin resistance, hyperglycemia, and type 2 diabetes. Behavior modification is imperative in helping decrease obesity and to prevent and manage diabetes. Results of research by Tuomilehto et al. provide insight into the area of behavior modification to manage diabetes (5). Subjects with impaired glucose tolerance have an increased risk for type 2 diabetes and, therefore, form an important target group for interventions aimed at prevention of the disease (5).

Diabetes is a serious disease that particularly effects older and minority populations. Many complications that might result from diabetes can be avoided or delayed with proper management. Since patients deliver most of their own diabetes care, it is important to understand the factors that affect self-management behavior such as health attitudes and knowledge of treatment modalities (6). Patients' attitudes are greatly

influenced by those around them, especially by their primary health care giver. Dietrich interviewed seven type 2 diabetes patients and concluded that physicians' attitudes at the time of diagnosis were critical in patients' attitudes about the seriousness of diabetes and their subsequent self-management behavior (7).

Low-income populations are an important target group for diabetes prevention and management efforts because they have increased incidence of several chronic diseases, poor diets, and higher rates of obesity and hypertension. There appears to be a trend for low-income individuals to receive inadequate medical support and inconsistent health care. This may be due to limited economic resources, low education, and no health insurance. These factors increase the need for nutrition education programs, such the Food Stamp Nutrition Education Program (FSNEP), to assess how they might be able to help low-income adults deal more effectively with their diabetes.

FSNEP is a nutrition education program that is funded by the Food and Consumer Service, USDA, using food stamp administrative funds. The program now exists in 48 states at a funding level in 2002 of $348 million (Personal Communication with Karen Konzelmann, Program Leader, CSREES, USDA, May 6, 2002). It targets food stamp households educating and encouraging members to make wise use of their food stamps and other food resources to achieve a balanced, healthy diet (9). FSNEP has the potential of reaching large numbers of individuals at risk for type 2 diabetes, or who already have the disease. However, it is important to establish a sound basis for FSNEP to redirect resources toward the prevention of type 2 diabetes or to engage in supporting the health care community in managing diabetes. To do this, leaders of FSNEP need to know the extent to which current or potential participants are receiving education to manage their diabetes. Furthermore, an understanding of clients' knowledge, attitudes, and current practices related to diabetes would be beneficial in designing appropriate educational materials.

Overall Goals of the Study

The goal of the study is to assess the extent to which diabetes education is available and easily accessible to the low-income adult population in Virginia and to assess FSNEP clients regarding knowledge, attitudes, and behaviors that may affect their

management of diabetes. The primary source of subjects will be currently enrolled FSNEP clients. Results from the study will be used to determine future program emphasis on prevention of type 2 diabetes and to develop appropriate education materials on diabetes for use in FSNEP. Also, the results may be useful to state extension leaders to assess whether or not increased diabetes education is needed in extension programs other than FSNEP.

Objectives for Type 2 Diabetes Study:

A. Agency Survey Objectives

1. To determine the prevalence of diabetes education programs that are available for low income adults in Virginia.
2. To assess the extent to which these programs are actually reaching low-income individuals.
3. To assess the extent to which agencies are conducting educational efforts toward prevention of type 2 diabetes.

B. Objectives for Client Survey with FSNEP Participants Who Have Diabetes:

1. To assess characteristics of those with diagnosed type 2 diabetes among Virginia FSNEP participants, including diabetes prevalence, race, gender, residence (rural vs. urban), current age, and age at diabetes onset.
2. To assess the extent to which clients with diabetes have received instruction/counseling from medical professionals relative to management of their disease (especially diet and exercise recommendations).
3. To assess the extent to which clients have been attempting to follow recommendations for managing their diabetes (especially those on diet and exercise) and the relative level of control they may have achieved.
4. To assess clients' perceptions of their knowledge related to diabetes management.
5. To assess FSNEP clients' feelings/attitudes about their diabetes.
6. To evaluate relationships among various factors involved in diabetes management, including knowledge, attitudes, and behaviors.

Chapter II

Review of Literature

Introduction

Diabetes mellitus is a disease that affects 15.7 million people in the United States (U.S.). There are 10.3 million people that have been diagnosed and another 5.4 million that do not know they have diabetes. About 2,200 new cases are diagnosed each day (1). Diabetes is also a costly disease. In 1997, the total annual cost of diabetes was estimated to be $98 billion (1).

Diabetes mellitus is a metabolic disorder characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both (10). There are several etiologies involved with the development of the disease. These range from autoimmune destruction of pancreatic β-cells, resulting in insulin deficiency, to abnormalities that cause resistance to insulin action. Carbohydrate, protein, and fat metabolism are affected by the decreased insulin secretion or the diminished insulin effectiveness. Thus, many metabolic processes are unable to proceed normally due to inadequate secretion of insulin or a decreased tissue response at one or more points in the complex pathways regulated by this hormone (10).

Types of Diabetes

There are several different forms of diabetes. Type 1 diabetes is an autoimmune disease in which the pancreas ceases to produce insulin. This occurs most often in children and young adults. Those with type 1 diabetes need to take exogenous insulin daily to stay alive. Type 1 accounts for 5 to 10% of all cases of diabetes (1).

Type 2 diabetes is a metabolic disorder that results from the body's inability to either make enough insulin or to use insulin properly. It generally occurs in adulthood, though it is increasingly being seen at younger and younger ages. Many people do not find out they have this disease until they develop a life threatening complication such as blindness, kidney disease, and nerve damage.

A third type is gestational diabetes, which develops in two to five percent of all pregnancies but disappears when pregnancy is over (1). Women who have had gestational diabetes are at an increased risk for developing Type 2 diabetes later in life.

There are some other specific types of diabetes that are manifested as a result of certain genetic syndromes, surgery, drugs, malnutrition, infections, and other illnesses (1). However the most prevalent type of diabetes is type 2, which accounts for 90% to 95% of all cases.

Diagnosis of Diabetes

In the diagnosis of diabetes, it is difficult to pinpoint a single number by which to judge everyone's glucose levels. The old standards for diagnosing diabetes are as follows: fasting plasma glucose [FPG] concentration ≥ 140 mg/dL or 2 hour glucose concentration on the oral glucose tolerance test [OGTT] ≥ 200 mg/dL. These values were used because some people whose values exceeded these subsequently developed retinopathy three to eight years later (11). New criteria for diagnosing diabetes have been published by the Expert Committee on Diagnosis and Classification of Diabetes Mellitus and are shown in Table 1 (11). The Expert Committee also made the decision to not recommend the OGTT in diagnosing diabetes because of its poor reproducibility, infrequent use, and its inconvenience to patients. A FPG <110 mg/dL is considered normal, while values falling between 110 and 125 mg/dL are considered to indicate an impaired fasting glucose (IFG).

Another factor that plays a role in the diagnosis of diabetes and its complications is glycosylated hemoglobin (Hb A1C). An elevated Hb A1C is associated with many microvascular and neuropathic complications. In both type 1 and type 2 diabetes, a positive correlation between Hb A1C levels and retinopathy and neuropathy has been documented in randomized clinical trials conducted over six to ten years. Based on results of four studies that included thousands of patients, the upper limit of normal (ULN) for Hb A1C was set at 6.0% because complications did not develop or grow worse if the Hb A1C was kept below 7.0% (22). When Hb A1C levels reached 7.0% to 8.0%, neuropathic and retinopathic conditions did develop but progressed slowly. In those that had Hb A1C levels above 8.0%, complications increased greatly.

Table 1. New Criteria for the Diagnosis of Diabetes Mellitus (11)

1. Symptoms of diabetes plus casual plasma glucose concentration ≥ 200 mg/dL. Casual is defined as any time of day without regard to time since last meal. The classic symptoms of diabetes include polyuria, polydipsia, and unexplained weight loss.

or

2. FPG ≥ 126 mg/dL. Fasting defined as no caloric intake for at least 8 hours.

or

3. 2hPG[1] ≥ 200 mg/dL during an OGTT. The test should be performed as described by the World Health Organization (WHO) using an exogenous glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.

In the absence of unequivocal hyperglycemia with acute metabolic decompensation, these criteria should be confirmed by repeat testing on a different day. The third measure (OGTT) is not recommended for routine clinical use.

[1]2 hours post meal blood glucose level.

There are three arguments that can be made for the use of Hb A1C in the diagnosis of diabetes. First, glycated hemoglobin levels reflecting integrated glucose concentrations over several months are a better measure of overall glycemia than glucose measurements that reflect glycemia only at the time of testing. Second, there is a strong association between Hb A1C levels and the microvascular and neuropathic complications of diabetes, which has been demonstrated both cross-sectionally and longitudinally (11). Even more important is the fact that there is a high correlation between changes in Hb A1C levels and red blood cell (RBC) glycated protein content in relation to the pathogenesis of diabetic complications (11). Hb A1C is an important biomarker for diabetes diagnosing, adding strength to the new testing criteria.

Also, criteria have been established for testing individuals who may be at high risk for type 2 diabetes, but who are currently asymptomatic (Table 2). If individuals at high risk can be identified early, steps can be taken to prevent on-set of full-blown diabetes. The OGTT or FPG test may be used to diagnose diabetes; however, in clinical

settings the FPG test is greatly preferred because of ease of administration, convenience, acceptability to patients, and lower cost (10).

Table 2. Criteria for screening for diabetes in asymptomatic, high-risk individuals (10)

1. Testing for diabetes should be considered in all individuals at age 45 years and above and, if normal, should be repeated at 3-year intervals.
2. Testing should be considered at a younger age or be carried out more frequently in individuals who:
    - are obese (≥ 120% desirable body weight or a BMI ≥ 27 kg/m^2)
    - have a first-degree relative with diabetes
    - are members of a high risk ethnic population (e.g. African-American, Hispanic, Native American)
    - have delivered a baby >9 lb or have been diagnosed with Gestational Diabetes Mellitus
    - are hypertensive (≥ 140/90)
    - have an HDL cholesterol level ≤ 35 mg/dl and/or a triglyceride level ≥ 250 mg/dl
    - on previous testing, had Impaired Glucose Tolerance or Impaired Fasting Glucose

Type 2 Diabetes

Type 2 diabetes was previously called non-insulin-dependent diabetes (NIDDM) or adult-onset diabetes. The disease more frequently occurs in people over the age of 30 years who are physically inactive and obese. Symptoms of diabetes include hyperglycemia, polyuria, polydipsia, weight loss, sometimes with polyphagia, and blurred vision. Those with Type 2 diabetes are usually not dependent on exogenous insulin for survival, but insulin may be needed to help control blood glucose (BG) levels (12). Type 2 diabetes is the cause of 90 percent of cases of impaired glucose tolerance (IGT). Those at the greatest risk for type 2 diabetes are individuals over the age of 45 years, have a family history of diabetes, are overweight, lead a sedentary lifestyle, have

low HDL cholesterol or high triglyceride levels, come from certain ethnic groups (i.e. African Americans, Latinos, Asian & Pacific Islanders, and Native Americans), and women who had diabetes during pregnancy (1). The warning signs of type 2 diabetes include frequent urination, unusual thirst, extreme hunger, unusual weight loss, extreme fatigue, irritability, frequent infections, blurred vision, cuts/bruises that are slow to heal, tingling/numbness in the hands or feet, and recurring skin, gum or bladder infections. However, people with Type 2 diabetes often have no symptoms in the early stages (1). The criteria for diagnosing diabetes are as follows: a casual plasma glucose concentration ≥ 200 mg/dL (casual is defined as any time of day without regard to time since last meal), fasting plasma glucose (FPG) ≥ 126 mg/dL, or an oral glucose tolerance test (OGTT) value of ≥ 200 mg/dL. These diagnosis tests need to be repeated on two separate occasions for a positive diagnosis of diabetes.

Complications of Uncontrolled Type 2 Diabetes

Control of type 2 diabetes is very important because of the complications that may arise if blood glucose levels are not kept within a normal range of a FPG of 60-109 mg/dL (13). Glycation of tissue proteins (AGE) and other macromolecules and excess production of polyol compounds from glucose are among the mechanisms thought to produce tissue damage from chronic hyperglycemia. Those who have diabetes have an increased risk of developing atherosclerotic, cardiovascular, peripheral vascular, and cerebrovascular diseases. The long-term complications of type 2 diabetes include (10):

1. Retinopathy with potential loss of vision
2. Nephropathy leading to renal failure
3. Peripheral neuropathy with risk of foot ulcers
4. Amputation
5. Charcot joint (i.e. damaged nerves in joint)
6. Autonomic neuropathy causing gastrointestinal genitourinary (damaged nerves in urogenital area)
7. Cardiovascular symptoms (i.e. atherosclerosis)
8. Sexual dysfunction

Type 2 diabetes has been called the "silent killer" because hyperglycemia can be present a long time before diagnosis, causing pathologic and functional changes in target tissues without clinical symptoms (10).

Medical Nutrition Therapy in the Control of Type 2 Diabetes

In January 2002, the American Diabetes Association and American Dietetic Association published a position paper on the treatment and prevention of diabetes and related complications. The position paper described several goals for those with diabetes (14):

1. Attain and maintain optimal metabolic outcomes including
    - Blood glucose levels in the normal range or as close to normal as is safely possible to prevent or reduce the risk of complications of diabetes.
    - A lipid and lipid protein profile that reduces the risk for macrovascular disease.
    - Blood pressure levels that reduce the risk for vascular disease.
2. Prevent and treat the chronic complications of diabetes. Modify nutrient intake and lifestyle as appropriate for the prevention and treatment of obesity, dyslipidemia, cardiovascular disease, hypertension, and nephropathy.
3. Improved health through healthy food choices and physical activity.
4. Address individual nutritional needs taking into consideration personal, ethnic and cultural preferences and lifestyle while respecting the individual's wishes and willingness to change.

Nutrition recommendations for a healthy lifestyle for the general public are also appropriate for persons with type 2 diabetes. Those who have type 2 diabetes are usually overweight and the medical nutrition therapy should focus on a reduction in energy intake with an increase in energy expenditure through physical activity. An increase in physical activity can help improve blood glucose levels, decrease insulin resistance, and reduce the risk of cardiovascular disease (14).

Trends in Obesity and Diabetes in the United States

In recent years the rates of obesity and diabetes in the United States have reached

epidemic proportions. The researchers who conducted the Behavioral Risk Factor Surveillance System (BRFSS) in 2000 bring to light the startling nationwide increase in prevalence of obesity and diabetes. The BRFSS is a standardized telephone survey conducted by state health agencies in collaboration with the Centers for Disease Control and Prevention (CDC). It has been conducted in all states, with the main outcome measures being body mass index (BMI - calculated from a self-reported weight and height), self-reported diabetes, prevalence of weight loss or maintenance attempts, and weight control strategies used (4).

Researchers reported that the prevalence of obesity (BMI $\geq$30kg/m^2) in 2000 was 19.8%, the prevalence of diabetes was 7.3%, and combined the prevalence for individuals having both was 2.9%. The state with the highest rates of obesity (24.3%) and diabetes (8.8%) was Mississippi. Colorado had the lowest rate of obesity at 13.8% and Alaska had the lowest rate of diabetes at 4.4%. Based on results of the BRFSS, twenty-seven percent of US adults do not participate in regular physical activity and another 28.2% are not regularly active (4). Of those participants who were trying to lose weight or maintain weight, only 17.5% were following recommendations of eating fewer calories and increasing physical activity to more than 30 minutes five times a week. Mokdad et al. concluded that the prevalence of obesity and diabetes continues to increase among U.S. adults and interventions are needed to improve physical activity and diet in communities nationwide.

Weight plays an important role in the development and management of type 2 diabetes. Looker et al. (15) examined weight changes that occurred before and after the diagnosis of diabetes and the association of these changes with treatment and microvascular complications. The researchers examined data collected over 35 years in a longitudinal study of Pima Indians to describe changes in BMI during the time before and after diagnosis of diabetes. Community residents were invited to undergo examinations on a biennial basis beginning at 5 years of age, irrespective of health. The examinations included anthropometric measures, funduscopy, urinalysis, and measurement of plasma glucose levels. Diagnosis of diabetes was determined by a 75-g oral glucose tolerance test (OGTT) according to World Health Organization guidelines or the presence of a documented clinical diagnosis. Weight and BMI were recorded at each examination and

changes and rate of change were calculated. The group was divided into those who were either receiving oral therapy, insulin therapy, or no hypoglycemic treatment (15).

BMI tended to be higher just after diagnosis, but over time the BMI tended to be lower. When age at the onset of diabetes was factored in, the BMI tended to be greater just after diagnosis for those with early onset diabetes, while those with late onset diabetes showed a more linear trend of BMI being high at diagnosis but decreasing over time. When the researchers looked at the whole group, there was a statistically significant increase in BMI in all periods before diagnosis of diabetes (15).

Intra-individual changes in BMI differed by age at onset of diabetes. Before diagnosis, the early onset group gained 0.5-1kg/year, whereas the late onset group gained <0.5kg/year. After diagnosis, the rate of change in BMI was similar in both groups. For most time points, the individual differences in both groups were significantly different from 0. Although mean BMI was consistently higher in women than men, the rate of change in BMI was similar for both sexes and generally did not differ significantly. Individuals who were not taking antidiabetic medication tended to continue to lose weight after onset of diabetes. Insulin therapy was associated with greater weight loss at short durations of diabetes but less weight loss or even weight gain at durations of diabetes more than 5 years after diagnosis. After 10 years of diabetes, individuals taking no medications always had a greater decrease in BMI than those taking any type of hyperglycemic medication (15).

Obesity contributes to the development of type 2 diabetes, and weight control efforts are an important component of prevention and clinical management of diabetes. Results of the study by Looker et al. showed that the Pima Indians with diabetes had tended to gain weight before diagnosis and had progressively lost weight afterward (15). The use of hyperglycemic medicines was associated with rate of weight change, with those not treated with medicines tending to lose weight faster that those taking hyperglycemic medicines.

In recent years, there has been an increasing trend in the occurrence of type 2 diabetes, resulting in increased incidence of microvascular and macrovascular conditions. Mokdad et al. studied diabetes trends in the United States (U.S.) during the period of 1990 to 1998 (2), using results of the Behavioral Risk Factor Surveillance System

(BRFSS). During this period, the prevalence of diabetes increased across all socio-economic classes for both men and women. Those who where between the ages of 30-39 years and those who had more education had the largest increase in the prevalence of diabetes. There was an increase of 76% in individuals aged 30-39, a 64% increase in those with "some college education," a 52% increase in ex-smokers, and an increase of 47% in individuals who had at least a four-year college education. Researches suggested that some of the recent increase in diabetes could be due to heightened public awareness of diabetes and, thus, may represent increased diagnosis rather than increased prevalence. Although it is believed that there is a genetic tendency involved in type 2 diabetes, modifiable risk factors such as obesity and physical inactivity are major determinants of the disease (5).

Projections of Diabetes for the Future in the United States

Boyle and colleagues did a prospective study that looking at the future impact of the changes in demography and disease prevalence in the U.S. projected through 2050. The researchers looked at age, sex, and race-specific diagnosed diabetes rates predicted from 1980 - 1998 trends in prevalence data from the National Health Interview Survey combined with Bureau of Census population demographic projections (16). The total number of people with diabetes is projected to rise from 11 million in 2000 to almost 20 million in 2025. By 2050, the number to have diabetes is projected to be >29 million people, which would be a 165% increase over the 2000 level. These projections indicate an overall increase of diabetes from 3.99% in 2000 to 7.21% in 2050. Researchers stated that the largest increases would be seen in the oldest age category. Women who were ≥ 75 years of age with diabetes will rise from 1.2 million in 2000 to >4.4 million in 2050 (+271%). The number of men for the same age group is projected to rise from 0.8 million in 2000 to >4.2 million in 2050 (+437%) (16).

Boyle et al. (16) made three projections of the number of people in which diabetes may occur using increasing prevalence rates and projected demographic changes in the U.S. population from 2000 to 2050. The first set of projections, based on constant prevalence rates and the middle series of population projections from the U.S. Census Bureau, adjusted for 2000 demographics, indicates that 11.8, 13.3, and 15.9 million

people will have diabetes in 2010, 2025, and 2050, respectively. The second set of diabetes projections, based on the same 2000 demographics, but using increasing prevalence rates instead of a constant rate indicates that 12.9, 16.1, and 22.4 million will have diabetes in 2010, 2025, and 2050, respectively. The third projection scenario, which the researchers believe to be the most likely situation over the next 50 years, indicates that 14.1, 19.9, and 29.1 million people will have diabetes in 2010, 2025, and 2050, respectively. These increases are mainly attributed to population growth and demographic changes such as a higher percentage of the population being over the age of 65 (16).

The largest increases that occur in the race specific projections of diabetes are in the oldest age groups. Caucasian men ≥ 75 years of age with diabetes are likely to increase from 686,000 in 2000 to 3.1 million in 2050 (+352%). For Black men in the same age group, there is a projected increase from 34,000 in 2000 to 932,000 in 2050 (16). The projected number of Caucasian females ≥ 75 years of age with diabetes is likely to increase by 210% between 2000 and 2050 (from 1.0 million to 3.1 million), whereas the number of Black females with diabetes in this age group will rise by 555% (from 168,000 to 1.1 million). Although Caucasians account for the majority of the projected people with diabetes, the largest percentage increases is expected to occur among Blacks, with 4.6 times as many Black males to have diabetes in 2050 as in 2000. Black females are projected to be the next fastest growing group with diabetes, with Caucasian males and females following (16).

There are several limitations in the projections reported by Boyle et al. (16) as indicated by the researchers. The omission of the Hispanic-specific projections is a problem because Hispanic prevalence rates are overtaking those of Caucasians and African Americans, therefore, the projections may understate the future burden of diabetes (16). Also, the projections do not assume advances in diabetes prevention or the possibility of a cure for diabetes in the next 50 years, which may reduce the numbers with diabetes. Other factors that may affect the accuracy of these are increased life expectancy, increased diabetes screening, changes in diagnostic criteria, increased or decreased access to medical care, and the increasing prevalence of childhood diabetes.

Boyle et al. (16) concluded that in 50 years the number of people with diagnosed diabetes in the U.S. will increase by 165% from 11 million in 2000 to 29 million in 2050. The biggest increases will be among those 75 years and older (336%) and among blacks (275%). Diabetes is a major public health problem and the projections set forth by Boyle et al. emphasizes that fact. Improved primary prevention of diabetes will help reduce the number of people with diabetes and the economic cost of diabetes as well.

Diabetes in Virginia

Diabetes is a very common disease in Virginia. Over 220,000 Virginians who are over the age of 18 have been diagnosed with diabetes and there are an estimated 75,000 more that do not even know they have it (3). The Virginia Department of Health (VDH) reports that diabetes is the seventh leading cause of death in Virginia. In 1996, diabetes was the primary cause of death of 1,255 Virginians. In an additional 2,757 deaths, diabetes was listed as a contributing cause.

Diabetes is a very expensive disease. One in every seven healthcare dollars is spent on diabetes treatment. In 1995, the average cost per hospital admission for persons with diabetes was $11,679, which is 39% more than the average cost for all admissions ($8,393). Over $970 million were spent on hospital admissions for persons with diabetes in 1995. The direct cost (medical care) and indirect cost (lost productivity and premature mortality) of diabetes in Virginia totaled about $2.8 billion in 1992 (3).

Social and Emotional Effects of Diabetes

There are also social and emotional effects of the disease on the patient because of the demand of therapies. Hunt et al. (17) conducted a study with low-income Mexican Americans who had type 2 diabetes. The objective of the study was to see how behavioral factors affect what patients do for self-care. The researchers found that patients were concerned about their diabetes and they made efforts to control their blood glucose level (17). Behaviors towards self-care were not based on just one set of instructions, but instead were part of an ongoing process of making small decisions. Patients made continuous decisions on what to eat, whether to exercise, and when to take medications. Results of this study strongly indicate that self-care decisions are made

within the context of patients' broader situations, and are significantly influenced by their available resources, priorities, social responsibilities, and level of autonomy (17). Type 2 diabetes is a demanding disease that requires a great deal of the patient to be willing to change his or her usual lifestyle to better manage the disease.

Attitudes and Type 2 Diabetes

Type 2 diabetes is more prevalent in older adults and in minorities. Many complications from diabetes can be avoided or delayed with proper management. Diabetes is foremost a self-managed disease with treatment and prevention of acute and long-term complications being largely a function of the patient's daily decisions. Because patients deliver most of their own diabetes care, it is essential to gain an understanding of the factors that affect self-management behavior, including health attitudes and treatment modalities (6).

The relationship of patient attitudes with behaviors are central in both the Health Belief Model and in the Theory of Reasoned Action 2 (6). Several studies have demonstrated the importance of patients' attitudes and belief on health behavior. Tessier et al. (18) looked at the effects of aerobic exercise in the elderly with type 2 diabetes, but they also conducted studies with normal and middle-aged diabetic subjects. The assessment of attitudes of type 2 diabetes patients is a new area of research. Results obtained by Tessier et al. indicated that an exercise intervention resulted in improvement of attitudes, without providing any specific intervention to improve knowledge about diabetes.

Several studies have investigated factors that influence patient attitudes. McCord and Brandenburg found that type 2 diabetes patients described as "noncompliant" were more likely to believe that diabetes would not affect their life outcomes (18). Patients' confidence in modern medicine has been found to be a factor in their response to treatment recommendations (17,19). Dietrich interviewed seven type 2 diabetes patients and concluded that physician attitudes, at the time of diagnosis, were critical in patients' attitudes about the seriousness of diabetes and their subsequent self-management behavior (7). Similarly, Hunt et al. found that a patient's attitudes toward insulin therapy

were influenced by that patient's interaction with healthcare professionals, as well as personal experience and observation (20).

Patients' beliefs, attitudes, and behaviors are influenced by cultural and socioeconomic factors (21). The relationship of culture to health beliefs, attitudes, and behavior is especially important in the treatment of diabetes, which usually involves changing patterns of eating, physical activity and other culturally embedded behaviors. If diabetes treatment recommendations are to be effective, they must be sensitive and relevant to the culture of the individuals who are expected to carry them out (22).

Diet and Type 2 Diabetes

Diet plays an important role in the control of type 2 diabetes. An unbalanced diet is also one risk factor for this disease. Kushi et al. (23) looked at the role of cereals, legumes, and chronic disease risk reduction because there is growing evidence that cereals and legumes play important roles in the prevention of chronic diseases. Highlighted in Kushi's research is the theory proposed by Burkitt and Trowell that dietary fiber plays a beneficial role in preventing several diseases that are common in Western societies. Based on observations of diet and disease in Africa compared with the United Kingdom and other industrialized nations, Burkitt and Trowell proposed that the refining of grains and loss of dietary fiber are important in the increased incidence of diseases including large bowel cancer, coronary artery disease (CAD), and diabetes. Cereal grains and their products are among the most commonly consumed foods and are staples in most human diets.

Kushi et al. (23) looked at epidemiological studies of diet and suggested that a total energy intake is a confounder in diet-disease associations because intakes of almost all dietary factors are highly correlated with energy intake. This can be explained by the fact that when more food is consumed, more dietary components are consumed. It is also known that physical activity generally increases total energy intake and is also inversely related to heart disease. Overall, in the studies reviewed by Kushi et al. consumption of whole grain foods was linked to a reduced risk of several cancers and CAD, whereas, refined-grain foods were associated with increased risk.

Meyer et al. (24) looked at type 2 diabetes incidence in relation to dietary intake of carbohydrates and fiber in older women. This was a prospective cohort study with 35,988 older Iowa women who were initially free of diabetes. The researchers examined the relationship of baseline intake of dietary carbohydrates, fiber, magnesium, and carbohydrate rich foods, based on glycemic index, with the incidence of diabetes. During the six-year follow-up, 1,141 cases of diabetes were diagnosed. Intakes of total grain, whole grain, dietary fiber, cereal fiber and magnesium showed a strong inverse relationship with the incidence of diabetes, after adjustments were made for potential non-dietary confounding variables (i.e. age, smoking, physical activity, BMI, waist-to-hip ratio, family history, and education). After multivariate-adjustment, the relative risk was significant (P= 0.0089) across the quintiles for whole-grain intake (1.0, 0.99, 0.98, 0.92, and 0.79). The greater the amount of whole grain consumed, the lower the risk was for type 2 diabetes. The relative risk decreased significantly when total fiber and magnesium intake increased. Intakes of total carbohydrates, refined grains, fruits, vegetables, and soluble fiber, as related to glycemic index, did not affect diabetes risk. Results of this study emphasize the importance of diet and how it can play a significant role in lowering the risk of type 2 diabetes (24).

Diet in early life appears to play a significant role in chronic disease development. Lindquist et al. (25) conducted a study to assess whether or not dietary factors explain ethnic differences in serum lipid levels and insulin profiles in children, independent of body composition and social class background. A total of 95 Caucasians and African Americans were compared on diet, lipid levels, and insulin profiles, socio-demographic background, anthropometry, and physical activity. Data used in this study were collected in conjunction with an ongoing longitudinal study of childhood obesity (25). Most of the children began participating at approximately 7 years of age and were in year 2 or 3 of participation. The mean age was 10 years.

Results indicated no differences in the two ethnic groups for age, stage of pubertal development, or body composition. However, social class background differed significantly by ethnicity, with Caucasian children having a significantly higher socioeconomic background than the African American children (25). Total cholesterol was higher and triacylglycerol concentrations tended to be lower in the African American

children. Also, the African American children had significantly lower insulin sensitivity levels (approximately 40%) and a two-fold greater acute insulin response than Caucasian children (25).

There were also differences in the dietary habits of the two ethnic groups. African Americans tended to consume fewer grams of carbohydrate (CHO), fewer servings of dairy products, less energy as added sugar, and more servings of fruit and meat per day than Caucasian children. African American children had significantly lower levels of triacylglycerol, lower insulin sensitivity, and higher acute insulin response than Caucasian children. The authors concluded that the results showed an ethnic difference in disease risk that could be substantially reduced by dietary patterns. African American children had significantly lower insulin sensitivity and a greater acute insulin response than did whites after adjustment for social class, body composition, macronutrient intake, and food group consumption (25). These findings indicate that risk for diabetes is due to several factors, only one of which is diet.

Behavior Modification and Diabetes

Individuals with impaired glucose tolerance have an increased risk for type 2 diabetes and, therefore, should be targeted with interventions aimed at preventing diabetes (5). There is strong evidence that modifiable risk factors such as obesity and physical inactivity are the main nongenetic determinants of the disease. Behavior modifications can make the difference in preventing and managing the disease. Tuomilheto et al. conducted a study with 522 overweight (BMI > 25), middle-aged subjects, who were randomly assigned to a control or intervention group, controlling for age, body-mass index (BMI= weight in kilograms divided by height in meters squared), and impaired glucose tolerance (IGT). The purpose of the study was to determine whether or not type 2 diabetes could be prevented by interventions that affect the lifestyles of subjects at high risk for the disease. The intervention group received individualized counseling aimed at reducing weight, decreasing intake of fat and saturated fat, and increasing fiber intake and physical activity. Subjects in the control group were given general oral and written information about diet (a two-page leaflet) and exercise at base line and during subsequent annual visits, but no individualized education

was provided to them. The first subject was assigned to a group in November, 1993, and the last in June 1998. At that time, 90 percent of the study subjects had been enrolled in the trial for at least 2 years, and the main duration of the follow-up was 3.2 years.

In the first year of the trial the mean (±SD) body weight decreased by 4.2 ± 5.1 kg (4.7% ± 5.4%) in the intervention group and decreased by 0.8 ± 3.7 kg (0.9% ± 4.2%) in the control group ($P<0.001$). Waist circumference, fasting plasma glucose concentration, plasma glucose concentration two hours after oral glucose challenge, and serum insulin concentration at two hours after glucose challenge significantly decreased among subjects in the intervention group as compared with the control group. The subjects in the intervention group were more likely to report modifications in their diet and exercise habits (5). Results of this study show that positive behavior changes can reduce the risk of developing impaired glucose tolerance and type 2 diabetes.

Physical Activity and Type 2 Diabetes

A study conducted by Pan et al. (26) focused on the effects of diet and exercise on delaying the development of type 2 diabetes. This was a controlled clinical trial in which the 530 IGT subjects were randomized into either the control group or one of three intervention groups. The interventions were (a) diet only, (b) exercise only, and (c) both exercise and diet. Participants were examined at baseline and every two years thereafter for six years.

The intervention groups received instructions and counseling weekly for one month, then monthly for three months, and then once every three months for the remainder of the study. No individual counseling was given to the control group; however, they were provided with brochures on general information about IGT, type 2 diabetes, diet, and exercise. Follow-up assessments were done every three months by a local physician, who measured subjects' weight, blood pressure, and urine glucose. If a subject was suspected of having developed diabetes, they were tested for diabetes with a 75g OGTT. Of the 577 subjects with IGT, 530 completed the study. The development of diabetes was significantly lower ($P < 0.0035$) in the treatment groups than in the control group. Participation in exercise was significantly higher in the diet-plus exercise group than in the control group at baseline and at the six-year follow-up. However, there were

no significant differences in the incidences of diabetes among the experimental groups who had received active treatment (26). The results show that over several years, the incidence of type 2 diabetes can be decreased with lifestyle interventions.

Physical activity plays a key role in sensitivity to insulin and glucose uptake. Studies conducted with normal and middle-aged diabetic subjects show that physical activity results in numerous beneficial adaptations in skeletal muscles, including an increase in glucose transporter GLUT-4, which results in an increased sensitivity to the action of insulin. Results indicate that exercise raises GLUT-4 transporters to which insulin binds for transporting glucose into the cell.

Tessier et al. (18) looked at the effects of aerobic exercise in elderly individuals with type 2 diabetes mellitus (DM). The study objective was to evaluate the impact of an aerobic exercise program in the treatment of elderly patients with type 2 diabetes in relation to metabolic control, physical capacity, quality of life (QOL), and attitudes toward diabetes. The patients were randomly assigned to either an experimental group (n=19) or control group (n=20). After the baseline visit, the patients went through a three-hour oral glucose tolerance test (OGTT) and were tested for levels of Hb A1C and fructosamine. They also completed a questionnaire on QOL and attitudes toward type 2 diabetes and were subjected to a Balke-Naughton treadmill test. Subjects were then randomly assigned to an active physical training program (E) or to a control group (C). Measurements were repeated 16 weeks after baseline. The physical activity program consisted of training three times a week with each session including a 10-minute warm-up phase, a cardiovascular session of 20 minutes of rapid walking, a strength /endurance session consisting of two sets of 20 repetitions affecting major muscle groups for 20 minutes, followed by 10 minutes of stretching exercises and relaxation. At baseline there were no differences between the E and C groups. Compliance with the exercise program was measured by the attendance record at each exercise session, which indicated a > 90% compliance in the E group. No significant change was shown for QOL in either group. Regarding attitudes, there was a significant difference at the 0.05 level between Group E (3.55 ± 0.41) and Group C (3.31 ± 0.32), with Group E improving significantly more than the control group. Tessier et al. concluded that with exercise there is improvement in attitudes without providing any specific intervention to improve attitudes toward

diabetes. Results of these studies indicate that approaches to increase physical activity may be successful in the older population with type 2 diabetes (18).

ACSM's Recommendations for Exercise and Type 2 Diabetes:

Since exercise increases insulin sensitivity, it is an important component to include in the treatment of type 2 diabetes. However, exercise has seemingly been under-utilized as a therapy for people with this disease. In 2000, the American College of Sports Medicine (ACSM) (28) published a position paper on exercise and type 2 diabetes. The paper focused on how exercise can be beneficial in all stages of type 2 diabetes as long as the patient's health care team is actively involved, tests are performed for limitations, and progression is done in an appropriate manner. The short and long-term goal of type 2 diabetes management is to maintain relatively normal blood glucose levels and optimal lipid profiles. Regular physical activity promotes beneficial physiological changes including reduction of resting and submaximal heart rate, increased stroke volume and cardiac output, enhanced oxygen extraction, and lowered resting and exercise blood pressure. Those with type 2 diabetes are at increased risk for several cardiovascular risk factors, including hypertension and dyslipidemia. Thus, therapy to control glucose levels and reduce long-term complications should focus on behavioral interventions that include a physically active lifestyle (28).

Physical activity programs for those with type 2 diabetes, who do not have significant physical complications or limitations, should include appropriate endurance and resistance exercise for developing and maintaining cardiorespiratory fitness, body composition, muscular strength, and endurance. In order to facilitate weight management and achieve health-related benefits, it is strongly recommended that individuals with type 2 diabetes expend at least 1000 kcal per week in physical activity. Appropriate frequency, intensity, duration, and mode of physical activity should be identified and recommended for each individual as shown in Table 3 (28).

Characteristics of Low-Income Individuals with Diabetes

Low-income persons tend to be at greater risk for developing type 2 diabetes because they have many problems shown to be risk factors including poor diets and

Table 3. Physical Activity Recommendations for those with Diabetes (28)

Frequency- How often should a person with type 2 diabetes be active?	Persons with type 2 diabetes should engage in at least three nonconsecutive days and up to five physical activity sessions each week to improve cardiorespiratory endurance and achieve desirable caloric expenditure. Those taking insulin may prefer to participate in daily physical activity, in order to lessen the difficulty of balancing caloric needs with insulin dosage. Obese diabetic individuals may need to participate in daily physical activity to maximize caloric expenditure for effective weight management.
Intensity- At what level should the physical activity be performed at?	For most individuals with type 2 diabetes, low to moderate activity of 40-70% of VO_{2max} is recommended to achieve cardiorespiratory and metabolic improvements. Most importantly, prescribing low to moderate intensity activities for persons with type 2 diabetes minimizes the risks and maximizes the health benefits associated with exercise (i.e. blood glucose reduction, increased insulin sensitivity and metabolic clearance rate).
Duration- How long should the physical activity session be?	The length of time needed for an effective physical activity session is dependent upon the desired caloric expenditure and the intensity of the session. Ideally, the recommended time for the physical activity session is at least 30 minutes or more to achieve recommended caloric expenditures. When weight management is the main focus, the duration should be increased gradually to 60 minutes.
Mode- What types of activities are recommended for people with type 2 diabetes?	The recommended mode of physical activity for the client is dependent upon how the disease has affected them and their ability to be active. Recommended activities include those that afford greater control of intensity, have little interindividual variability in energy expenditure, are easily maintained, and require little skill. Walking is generally the most commonly prescribed exercise. However, individuals with complications, such as peripheral neuropathy or degenerative arthritis, may require alternative modes of exercise that are non-weight bearing (i.e. stationary cycling, swimming, aquatic activities). If possible, resistance training on two days per week is recommended. A minimum of 8-10 different exercises involving major muscle groups and at least one set of 10-15 repetitions to near fatigue is recommended. All persons with type 2 diabetes should be carefully screened before beginning this type of training and should receive proper supervision and monitoring.

higher rates of obesity and hypertension (29). These problems are not always taken into account by health care professionals. The death rate among the low-income population is twice as high as those with higher incomes (29). This higher death rate can be attributed to an increased rate of several chronic diseases and conditions and delayed diagnosis and treatment.

Taira et al. (30) conducted a survey of over 6,000 Massachusetts state employees and found a significant ($p<0.01$) inverse relationship between income level and the prevalence of chronic diseases and conditions. Those individuals who had an annual income of less than $20,000 had an average of 3.3 chronic diseases and conditions. When the salary level increased to an annual income of $20,000 to $40,000, there was a decrease in the average number of chronic diseases and conditions to 2.8. Findings from the study also showed that 70% of respondents had seen a physician at least once in the previous six months and 89% had a regular physician, usually a general internist (30).

Participants in the Food Stamp Nutrition Education Program (FSNEP)

FSNEP is a nutrition education program that is funded by the Food and Nutrition Service (FNS), USDA, using food stamp administrative funds. The target audience of the FSNEP program are those people who are in households with gross incomes at 130% of poverty level (USDA Nutrition Education Plan Guidance, March 2001). Nutrition educational efforts are directed at educating and encouraging members to make wise use of their food stamps and other food resources to achieve a balanced, healthy diet (8). This program is in existence in 48 states and there is interest among state leaders in conducting diabetes education with FSNEP clients who have type 2 diabetes (Personal Communication, Dr. Ruby H. Cox).

Ability of Low-Income Individuals to Access Medical Treatment

It is generally known that low-income individuals do not have adequate health care insurance; therefore, regular physician and dietitian visits may be unaffordable for them (31). Strickland et al. (32) conducted a study in which they interviewed 281 members of low-income minority rural households in Georgia to learn more about how low-income individuals deal with health care. Twenty-four percent of respondents had a

chronic disease and 81% were seen by a physician on a regular basis. Only 6% took advantage of free medical services. There was only an 86.9% chance that a person would be seen by a physician to be treated for a chronic disease. Many people, who went to their physician, did not make return visits because they believed that their disease or condition was under control, or they could not afford follow-up visits.

Medicare and Medicaid are two payment options for those who might not be financially able to pay for proper health care. Medicare is a health insurance program for people who are 65 and older and is available to some people under age 65 who have disabilities, end-stage renal disease (ESRD), or permanent kidney failure requiring dialysis or a kidney transplant (33). There are two parts to Medicare: Part A (Hospital Insurance) and Part B (Medical Insurance). Most people receive Medicare Part A automatically when they reach age 65. There is no monthly fee because they or a spouse paid Medicare taxes while they were working. Part A Medicare helps to cover in-patient care in regular hospitals, critical access hospitals, skilled nursing facilities, hospice care, and some home health care. Part B Medicare is available for those who are eligible for premium-free Part A if they are a United States citizen or permanent resident and are age 65 and older. Enrolling in Part B of Medicare is the person's choice and there is a monthly premium which was $50, in 2001. Medicare Part B helps to cover physicians' services, outpatient hospital care, and some other medical services that Part A does not cover, such as the services of physical and occupational therapy and some home health services (33).

Medicare and Medicaid Coverage for Those with Diabetes

People with Medicare, who have diabetes (insulin users and non-users), are eligible for some coverage of diabetes treatment. If authorized by a doctor or other health care provider and the patient is at risk for complications from diabetes, Medicare covers certain services including glucose monitors, test strips, lancets, and diabetes self-management. Dietary counseling can be covered when the patient is initially diagnosed, but may not be covered at a later time. Medicare will pay for 80% of the cost of self-management classes once the $100 Part B deductible is met.

Medicaid is a program that provides medical coverage for certain individuals and families with low incomes and limited resources (34). Medicaid became law in 1965 as a jointly funded cooperative venture between the Federal and State governments to assist States in providing adequate medical care to eligible needy persons. Medicaid is the largest program providing medical and health-related services to America's poorest people. Within broad federal guidelines, each State:

1. establishes its own eligibility standards;
2. determines the type, amount, duration, and scope of services;
3. sets the rate of payment for services; and
4. administers its own program.

Medicaid coverage for those with Diabetes in Virginia

Virginia Medicaid coverage for diabetes includes the cost of insulin, syringes, blood glucose monitors and test strips for type 1 and 2 diabetes. The program also covers diabetes education, but only as a part of the physician office visit (35). Explanation of the disease, information regarding diet, and instructions regarding finger stick and urine testing are considered standard care for any patient who has been diagnosed with diabetes. Both Medicare and Medicaid are integral programs in helping low-income individuals to receive proper healthcare.

Use of Surveys in Research

Surveys are a useful method in obtaining specific information to determine a population's needs and to help predict trends. Results of survey research play an important role in helping to design and implement effective health education programs. There are several types of surveys, including those which use mail, telephone, and face-to-face interview methods.

Mail surveys. Mail questionnaires are one of the most popular instruments for gathering data in research. Mail surveys are fast, economical, and can be distributed widely to a large number of people at the same time (36). There is a greater chance that a mail

questionnaire will reach the intended respondents; whereas, respondents might not be at home when an interviewer makes a visit or a telephone call (37). However, receiving the mail survey does not insure that the completed instrument will be returned.

There are disadvantages to using mail surveys with a primary one being that there is generally a low response rate. Generally, response rates for mail surveys are between 20 and 30% and return rates that exceed 50% are unusual (38). Mail surveys can be time consuming when completed forms are not returned immediately. There is usually a time lag of about two months from initial contact to return of all surveys (37). It is up to the recipient to decide whether or not to fill out the survey (39). Since response rates to mail surveys are generally lower, this will contribute to error in the data due to non-response bias.

Telephone interviews. In the past, response rates for telephone interviews have tended to be higher than other survey methods (36); however current adverse reactions to telemarketers has reduced the usual response rate. Telephone surveys are advantageous in the sense that multiple calls can be made until the respondent is reached (37). Paxon et al. (39) stated that a telephone follow-up reminder is more effective than a mailed follow-up. This may be due to respondents feeling more important when contacted personally.

One of the disadvantages of telephone surveys is a reduced ability to locate participants with specific characteristics. Furthermore, telephone interviewing is a skilled activity that takes time to develop and requires proper training. It can be timely and costly for researchers to constantly recruit and train new interviewers. Those clients who do not have phones or are not at home during the daytime hours can also present difficulties for researchers (37). Not being at home, or not having a phone, are particular problems among low-income subjects. Technological advances like caller identification and answering machines can also be problems for telephone surveys (39).

Face-to-face interviews. Face-to-face interviews tend to receive higher response rates than other survey methods as this method is more personal for the respondent (36). If there are problems or questions about the survey, the interviewer is there to answer the questions; whereas with mail surveys or surveys done on a computer, there is no opportunity to provide clarification.

However, there can be complications when using the face-to-face interview method of surveying. Locating and making contact with respondents can be problematic, especially if interviewers are not familiar with the geographic location. Traveling to find respondents is time intensive and not always the most economic way to reach them (37). Time constraints can also present problems if respondents work or are not home during the daytime. Also, people may be reluctant to let strangers into their homes, but use of indigenous interviewers may help overcome this problem.

Questionnaire Design and Implementation.

Berdie et al. (1986) stated that a "series of predetermined questions," in a questionnaire format can provide important information about behaviors, attitudes, beliefs, and characteristics of populations. The survey questionnaire design is a product of survey design and is unique, depending on survey factors such as characteristics of the population to be surveyed, objectives, methods, timetable, and budget (42). Sheatsley (1983) states that questionnaire design, construction, and use involve both intellectual work and trial and error.

When designing a questionnaire it is important to consider whether the questionnaire will be administered by an interviewer, self-administered by the respondent, or completed by respondent on a computer in an interactive mode (42). Face-to-face interviews offer the following advantages: (1) flexibility including ability to repeat, probe, and make on-site distinctions about question appropriateness; (2) higher response rate; (3) ability to standardize and control the environment, including ability to record the time of the answer; (4) ability to control question order; (5) ability to observe nonverbal behavior; (6) ability to record spontaneous answers; (7) assurance that only the designated respondent answers the questions; and (8) enhanced ability to ensure that all questions are answered (44). A face-to-face interview may be the only option for administration of questionnaires if respondents are illiterate, semiliterate, or physically disabled to the extent that questionnaire self-administration is difficult or impossible (42).

The language and readability are two important factors to consider when designing a questionnaire. Once the type of questionnaire and method of administration have been chosen, the researcher must make decisions about wording of questions. An

important consideration in wording of items is the appropriate reading level for respondents (42). The main goal is to maintain an appropriate reading level such that the respondent clearly understands the questions. Readability (or comprehension level) can be estimated through a variety of formulas (42).

Design characteristics of a questionnaire are important in achieving a high response rate. Decisions must be made early in the design process regarding questionnaire length, layout, visual design (including paper color), print type, and respondents anonymity or identification (42). Question order is crucial to producing a questionnaire that flows logically and that encourages response. When selecting questions, it is essential to remember their relevance to the purpose of the survey and to the respondent. There are three strategies that can be used to help ensure that questions are worded or presented in ways that are relevant to the respondent:

1. If appropriate and necessary, multiple questionnaires tailored to specific characteristics of the respondent population (i.e. male/female, patient/caregiver, vegetarian/omnivore) can be used.
2. Multiple wording can be used to enable the respondent to choose the appropriate term.
3. Contingency or skip questions can be used, such as "If you answer No, proceed to question 4" (44).

Consideration should be given to not using double-barreled questions, which are those that are worded in a way that they include two questions. It is also important to minimize ambiguity of questions, limit length to 25 words or less, avoid "loading" or "leading" questions that encourage or suggest an answer, avoid use of double negatives, and use factual questions as opposed to abstract ones (42).

Two main response formats are open-ended and close-ended. The possible responses to an open-ended question are not specified, whereas, the responses to a close-ended question are specified. Questionnaires can use both types of response formats, but the study goals, budget, and timetable generally dictate which form is chosen (42).

Open-ended questions, for example, may be useful in preliminary survey work when the researcher does not know all the possible answers, or believes that all answers cannot be anticipated (43). Another potential use of the open-ended question is to identify potential responses, such as in a pilot test. This may allow for the main survey to

have a close-ended format. Open-ended questions allow for creativity, complexity, and clarity in responses (44).

There are disadvantages to open-ended questions. Open-ended questions may not be truly reflective of all responses, since respondents with better writing skills are at an advantage when faced with this type of question (44). Some respondents may view open-ended questions to be too time consuming and laborious. Also open-ended questions are more difficult to code for analysis.

Close-ended questions may be the preferred response format when conducting mailed or self-administered questionnaires (44). Advantages to close-ended questions are that responses are standardized in categories and are easier to code and analyze, and responses are usually relevant to the question as defined by the person constructing the questionnaire (42). The close-ended format may be viewed as easier to answer by respondents (44). Some disadvantages of close-ended questions include possible guessing or random responses, inability or unwillingness of a respondent to answer within the categories provided, and the possibility of forcing choices that do not describe the respondent's true answers, and failure to reflect the true level of response variation in the respondent population.

There are four categories of response formats for close-ended questions (1) interval, (2) ratio, (3) nominal, and (4) ordinal. An interval response is one that is ordered and for which there is equality among all answers. A ratio response format is an interval measure for which there is a set zero point. A nominal response is defined as one that is discrete (non-overlapping) and nonnumerical and it is not a graded scale. An ordinal response format uses rank-ordered categories (such as excellent, good, fair, and poor) and, therefore, has a directional meaning. As a standard for designing close-ended questions, all potential responses should be arranged in an uncluttered fashion and all answers should have a clear meaning (44).

Administration of Surveys

Conducting an interview is a skilled activity that takes time and proper training. When administering a questionnaire important goals are to obtain a high response rate and to get answers as close to the truth as possible. The acceptable response rate should

be determined prior to the distribution of the questionnaire. Kviz (45) states that response rate is defined as C/E where C is the number of completed questionnaires and E is the number of persons sampled by the questionnaire. There is no particular response rate for questionnaires that is considered adequate by all research (42). Some researchers feel that a 50% response rate is needed (44); whereas others look for a 90%+ response rate (41). The requirement of a signed informed consent may negatively affect response rate if sensitive issues are being surveyed. Singer reports that in one instance, 8% of a national probability sample indicated they were willing to be interviewed, but were not willing to sign a consent form (46).

Face-to-Face Interviews. Conduction of a face-to-face interview involves contacting the respondent and conducting the interview in person (42). The respondent population needs to be clearly identified and understood before conducting the interviews. Before beginning the interview, the purpose of the survey, use of responses, and confidentiality issues should be explained to the respondent. Training of interviewers is required when using this method to assure reliability of responses. Fowler and Mangione (1990) outlined four general rules on which to train interviewers:

1. Read questions exactly as worded.
2. Probe inadequate responses nondirectly.
3. Record responses without changes that are based on interviewer discretion.
4. Maintain an interpersonally neutral, nonjudgmental relationship with the respondent throughout the interview.

Summary

Diabetes mellitus is a disease that affects 15.7 million people in the United States. Obesity rates are increasing, which is a main contributor to impaired glucose tolerance, insulin resistance, hyperglycemia, and the development of type 2 diabetes. Type 2 diabetes is a serious disease that particularly effects older and minority populations. Many complications from diabetes can be avoided or delayed with proper education of patients to self-manage their disease. Diabetes can be prevented or controlled by appropriate lifestyle changes (diet and physical activity).

Low-income adults tend to be at greater risk for chronic diseases such as type 2 diabetes. There is a need to assess what community educational resources are available to and utilized by low-income individuals for enabling them to manage their diabetes. Results can be used by leaders of the FSNEP and other educational programs targeting low-income individuals, to make decisions on redirecting resources to diabetes education. Attitudes, behaviors, and knowledge play an important role in diabetes self-management. Assessment of attitudes, behaviors, and knowledge in low-income adults may provide information on how to better educate the low-income population in Virginia. The face-to-face interview appears to be the best survey method for low-income individuals in FSNEP because respondents can be clearly identified, their location is known, and they have limited literacy skills. Some do not have telephones and it is believed they would not return a mail survey.

Chapter III

Methodology

The goals of this study were (1) to assess the extent to which diabetes education is available and easily accessible to low-income adults in Virginia and (2) to assess a subset of low-income clients who have type 2 diabetes regarding certain factors that have been shown by prior research to affect success in self-management of diabetes. A cross-sectional survey design was used in this study. The study involved the implementation of two separate surveys. The first goal of the study was addressed by conducting a survey that involved the use of two questionnaires: (1) *Part I - Community Diabetes Education Survey* (CDES-I), which was completed by Extension agents on their geographic work area and (2) Part II - *Community Diabetes Education Survey for Hospitals, Medical Clinics, and Health Agencies* (CDES-II), which was completed by representatives of health agencies. The second goal of the study was addressed by conducting a diabetes patient survey involving the use of a questionnaire administered to clients of the Food Stamp Nutrition Education Program (FSNEP) who had reported having diabetes. Five Area EFNEP/FSNEP Coordinators and 49 FSNEP Program Assistants assisted in the conduction of the diabetes patient survey.

Enrolled clients of the Virginia FSNEP were chosen as the population for the diabetes patient survey. The FSNEP population includes a large number of low-income adults of all ages, a substantial proportion of which is composed of older clients who were expected to have type 2 diabetes. The FSNEP clientele also provides a list of low-income adults who could be conveniently located and interviewed. It was also believed that this population would be somewhat representative of other low-income adults in Virginia, since participants are randomly recruited from a wide range of settings. Originally, the researchers had planned to include clients of EFNEP, but a preliminary survey indicated that very few EFNEP clients have diabetes since they consists mostly of young homemakers. Thus, a decision was made to include only FSNEP clients as subjects in the study. The study was approved by the University Institutional Review Board for Research Involving Human Subjects. Each subject signed an informed consent form before data were collected.

Study Subjects and Recruitment

Subjects who responded to the Part II -*Community Diabetes Education Survey (CDES-II)* included representatives of healthcare agencies, such as hospitals, health departments, medical centers, and physician groups who might potentially provide diabetes education. Names of the representatives were not collected since the information they provided pertained only to their agency, not themselves. Furthermore, the information collected was viewed as being available to the public and was not confidential in nature, thus, these representatives were not asked to sign an informed consent form. The health agencies were identified by 16 Extension nutrition and wellness (N&W) agents with Virginia Cooperative Extension (VCE) who had volunteered to assist with data collection. The full identification procedure is located in Appendix A and is titled *Instructions for Part II: Community Diabetes Education Survey for Hospitals, Medical Clinics, and Health Agencies*. The 16 VCE agents used a list from the American Diabetes Association and local telephone directories to identify agencies in their health planning district (HPD) that might provide diabetes education. If the number of agencies was 10 or fewer, they attempted to complete the CDES-II with each of them. If the number was greater than 10, they randomly selected only 10 agencies for completion of the CDES-II.

Diabetes Patient Survey**.** The initial step in identifying subjects for the diabetes patient survey was to obtain a count of diabetes patients being worked with by FSNEP Program Assistants (PAs) across Virginia. PAs were instructed to provide to their supervisor (one of five area FSNEP coordinators) a count of all FSNEP clients who were aged 16 years or older and who had indicated they had diabetes. An arbitrary lower age limit of 16 years was used to help eliminate from the study those who had type 1 diabetes. This information was collected on clients who were enrolled in FSNEP during February and March 2002. There were 49 PAs who reported having one or more diabetes patients among their enrolled clients, thus, these PAs subsequently recruited subjects and served as interviewers in administering the study questionnaire. PAs who had six or fewer clients with diabetes were instructed to interview all of them. If the PA had more than six with diabetes, they were instructed to randomly select six clients to interview.

Demographic data on the subjects were obtained from FSNEP Family Records that had been previously collected when the individuals had enrolled in FSNEP.

Development of Survey Instruments and Pilot Testing

The CDES-I and CDES-II instruments were developed by the researchers. The purpose of the CDES-I instrument was to obtain information regarding Health Planning Districts (HPD) prevalence of type 2 diabetes among FSNEP clients, types of agencies diagnosing and treating diabetes, and types of diabetes education being offered by Extension in the HPD. The instrument consisted of five questions focused on obtaining information on diabetes education in each HPD of Virginia.

The purpose of the CDES-II instrument was to collect data from various health agencies regarding diabetes education programs that might be available to low-income individuals and whether or not low-income individuals are being reached with those educational efforts. Another focus of the instrument was to determine whether or not low-income adults in Virginia who have diabetes are provided with sufficient education to manage their disease. The CDES-II was developed by the researchers in this study.

Prior to the data collection phase, the CDES-I and CDES-II instruments were reviewed by 27 Nutrition and Wellness Agents and Area Coordinators during a meeting held in late January 2002. Changes were made to original forms to facilitate the interview process in urban areas where a large number of interviews might be conducted. Also, some questions were deleted, because it was determined that the information could be collected elsewhere. In order to receive an optimal response rate, concise and specific questions were used that could be answered by respondents. A list of area health care institutions and known diabetes education programs were provided to the agents and area coordinators as a starting point in identifying health agencies that might be providing diabetes education.

For the diabetes client survey, an instrument was developed by the researchers, titled the *Attitudes, Knowledge, and Behavior Questionnaire for Diabetes Patients* (hereafter referred to as the Diabetes Patient Questionnaire). This questionnaire was designed to be administered by non-professional interviewers (i.e. FSNEP paraprofessionals) as an interview protocol for low-income individuals, thus language

was kept simple. It incorporated many items from the *Diabetes Care Profile (DCP)*, which was developed and tested for validity and reliability by Fitzgerald et al. (48) as discussed below.

The DCP questionnaire was developed to assess patients' social and psychological factors related to diabetes and its treatment (48). Patient self-care is the fundamental principal in the management of diabetes. Assessing social and psychological factors associated with diabetes is important in designing education or counseling, protocols to teach and maintain self-care (48). The DCP was developed from an earlier instrument called the Diabetes Education Profile (DEP). This instrument was based on the Health Belief Model (HBM; 49) and included items that measure each of the four major constructs of the model: perceived severity of the disease, perceived susceptibility to complications, benefits of adherence, and barriers to adherence.

The DCP includes 14 scales taken from the DEP, which address important facets of patient adjustment to diabetes: control problems, social and personal factors, positive attitudes, negative attitudes, self-care ability, importance of care, self-care adherence, diet adherence, medical barriers, exercise barriers, monitoring barriers, understanding of management practice, long-term care benefits, and support attitudes (48). Cronbach and stepwise item-total correlations were used to confirm final scale content and as an estimate of scale reliability. These scales assess the patient's diabetes attitudes (i.e. the positive attitude and the support attitude scales), diabetes beliefs (i.e. the importance of care and the long-term benefits scales), adherence to diabetes self-care (i.e. the self-care adherence and the diet adherence scales), and the difficulties of diabetes self care (i.e. the medical barriers and the exercise barriers scales).

In earlier studies (48), the DCP scales were examined for both construct validity and concurrent validity. Validity is an estimate of the extent to which an instrument is measuring qualities that it is intended to measure. Construct validity was determined by the ability of the DCP scales to differentiate among patient groups. It was assumed that, if the scales were valid, patient responses would differ by diabetes type and treatment. Concurrent validity of the DCP scales were assessed by comparison with an external, previously validated scales measuring similar constructs (48).

Two unique studies were used to test the reliability and validity of the DCP with separate populations and methodology. For the first study, researchers administered the DCP to individuals with diabetes being cared for in a community setting. The DCP was initially self-administered. A trained interviewer subsequently reviewed the questionnaire with each patient to ensure that each question had been answered. Physiological measures were collected after the DCP was administered and the results were correlated with the DCP scale scores. The reliability of each DCP scale was determined by Cronbach's coefficient alpha calculated on standardized scores. Scale differences among the patients with type 1 diabetes, patients with type 2 diabetes using insulin, and patients with type 2 diabetes not using insulin were determined using analysis of variance (F ratio $p = .01$) and Tukey's HSD (global alpha= .05). Correlations of the DCP scales to Glycosylated Hemoglobin levels were examined by pair wise Pearson correlations. Correlations of ≥ 0.20 were considered supportive validity (48).

In the second study, the DCP and several previously validated scales were administered to individuals with diabetes receiving care at an academic medical center (48). The three external scales were selected because they measure constructs similar to the DCP scales. The Social Provisions Scale assesses the perceived availability of social support. The Center for Epidemiologic Studies Depression Scale (CES-D) measures level of depression, and the happiness and satisfaction scale. Reliability was determined by calculating Cronbach's coefficient alpha on each of the scales. To determine the relationship between DCP responses and the three external, validated instruments, Pearson correlations were calculated. A correlation value equal to or greater than 0.30 was considered to be an acceptable level of reliability.

Both the DCP and external instruments exhibited reliability with Cronbach coefficient scores ranging from .66 to .94. The researchers concluded that the DCP correlated well with external instruments measuring similar constructs (48). The social provisions scale correlated at significant levels with support attitudes, social and personal factors, and negative attitudes (48).

The results of both studies suggest that the DCP scales are reliable measures. Scale reliabilities were similar with the exceptions of the Social and Personal Factors and Monitoring Barrier scales. The reliability was a little higher in the medical center sample

than in the community sample because of a more diverse patient group in the medical center (i.e. a greater percentage of patients with Insulin Dependent Diabetes Mellitus and patients with Non-Insulin Dependent Diabetes Mellitus using insulin than is found in the community sample) (48).

The results of the comparisons indicate that the DCP scales obtain results that differ by diabetes type and treatment. For example, it was expected that the more severe the disease, the more difficulty patients would have in controlling their diabetes. Indeed, self-reported control problems were greatest for patients with Type 1 diabetes followed by patients with Type 2 diabetes using insulin. Furthermore, patients using insulin (a more intrusive self-care procedure than taking pills) reported a greater impact of diabetes on their social and personal lives. The DCP also showed sensitivity to differences among the three patient groups. The direction of score differences across the patient groups support the DCP's validity (48). It was concluded that the DCP is a reliable and valid instrument that is applicable to patients in both medical and community settings. The DCP provides specific information about factors that influence diabetes control, which cannot be obtained with more general measures.

In developing the Diabetes Patient Questionnaire, the researchers in the current study kept the format and language as simple as possible since it would be administered to a sample of low literacy individuals. The questionnaire consists of three sections - attitudes, behaviors, and knowledge. In the knowledge section the client's perceptions of his or her level of knowledge was assessed through questions about overall diabetes care, role of diet and exercise in diabetes control, and complications of diabetes. Attitudes towards diabetes were assessed with questions related to how they feel about having diabetes, how satisfied they are with life, and whether they feel their diabetes affects their life.

The behavior section of the Diabetes Patient Questionnaire focused on diet and exercise and included questions about how often respondents exercise, whether or not exercise has been a part of their everyday life, the extent to which behavior modification has occurred, and current dietary practices. Knowledge, attitudes, and behaviors were assessed because they play an important role in helping to manage diabetes (27).

Pilot Testing of the Diabetes Patient Questionnaire. The *Attitudes, Knowledge, and Behavior Survey for Diabetes Patients* was pilot tested by one of the investigators at a free medical clinic in Christiansburg, Virginia. The instrument was administered to nine low-income diabetes patients that were believed to be clients that would participate in the actual study. The individuals were asked to comment on the clarity of questions and to give their suggestions on modifying questions on the instrument. Several modifications were made to the questionnaire as a result of pilot testing. Terminology used in the instrument was kept simple since literacy is generally poor in the low-income population. The questionnaire was designed as an interview format and composed of three sections: attitudes, behaviors, and knowledge. A question was added to differentiate between those who are taking insulin, oral medications, or neither to control their diabetes. Also, a question was added to determine the length of time since subjects had been diagnosed with diabetes. Analyses of pilot data were conducted using SPSS 10.1.

Administration of Survey Instruments

CDES-I. The CDES-I survey instrument was mailed to Extension Nutrition and Wellness Specialty Agents working in 16 of the 22 planning districts, who had agreed to participate as interviewers. An explanation of the study and written instructions were provided (Appendix A) on how to complete the survey. The Nutrition and Wellness Agents were instructed to provide information on number of clients enrolled in FSNEP, number who had diabetes, number of hospitals, medical clinics, and health agencies located in their HPD that might potentially offer diabetes education, extent to which diabetes education had been provided in the HPD, how many participants were usually involved in the diabetes education, and what delivery method was used for the diabetes education. Follow-up reminders were sent out two weeks after the initial survey instruments were mailed reminding agents to complete the surveys. An electronic message containing a note of thanks was sent out by one of the researchers to the agents after receiving each completed survey instrument.

CDES-II. The Nutrition and Wellness (N&W) Agents also received by mail a supply of the CDES-II instruments for use in surveying hospitals, medical clinics, and health agencies about their diabetes education practices. Instructions for the completion of this

instrument are located in Appendix A . The N&W Agents received a list of some health agencies (Appendix A) to help identify those agencies to be contacted for the survey. The instrument was either completed by the health agency representative, or an N&W Agent who interviewed the agency representative and filled in their responses. A self-addressed, pre-stamped return envelope was included with each instrument that was mailed to an agency.

Diabetes Patient Questionnaire. The 49 PAs, who served as client interviewers, were provided with training and guidance by the five Area Coordinators (see written instructions in Appendix B). The five Area Coordinators were trained by the researchers during a January 2002 meeting on how to administer the Diabetes Patient Questionnaire and how to train the Program Assistants who would be administering it. In turn, they trained the PAs and provided guidance to them in workshops and through phone conversations and electronic messages. This training was designed to insure that PAs would administer the questionnaire in a consistent and unbiased manner and that all questionnaire items would be completed correctly.

The PAs conducted face-to-face, individual, or small group interviews with FSNEP clients during the period of March through April 2002. Cue cards showing response categories were shown to clients to facilitate their responses to many of the questions being asked.

Phone numbers were provided in case a Program Assistant or client had a concern or question about the study. Confidentiality was achieved by assigning each subject an identification number on the survey questionnaire instead of names. Subjects were given the assurance that their individual names would not be revealed nor used on any reports resulting from the study. The PAs mailed the completed client questionnaires, along with a copy of the demographic section of the FSNEP Family Record, directly to the State EFNEP/FSNEP Office at Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Data Handling and Analysis

Information from the instruments was entered into data set files by the principal investigator, using SPSS, Version 10.1 (50). Descriptive statistics were generated on data, as deemed useful by the researchers.

Further analyses were performed by an experienced statistician using SAS System, Release 8.2 for Microsoft Windows (51). Principal Component Analysis was used to generate Eigenvalues (weighted mean variance scores) for the subjects as a total group and for Caucasians and African-Americans separately on seven factors measured by the following scales or questions:

a. current physical activity level (scale formed by responses to Questions 20, 21, 22 and 24)
b. meal plan adherence (Questions 12-15).
c. diabetes control scale (Question 6)
d. perceived knowledge scale (Question 8)
e. feelings toward diabetes scale (Question 9)
f. physical limitations scale (Question 10)
g. perceived barriers to regular exercise scale (Question 25)

The Eigenvalues were then used to compute correlations among the seven factors using Pearson's correlation procedure. T-tests were used to compare African-Americans and Caucasians with each other using Eigenvalues for the seven factors**.** Subjects were also divided into groups by place of residence and mean variance scores were compared on the seven factors using tests. Univariate analysis was used to derive means, standard deviations, box plots, and histograms on the data.

Chapter 4

Manuscript for a Journal Article to be Submitted to *Journal of the American Dietetics Association*

Introduction

The incidence of type 2 diabetes has greatly increased in the U.S. population over the last decade and continues to increase each year by 6.5% (16). Over 90% of those with diabetes have type 2, for which obesity, unbalanced diets, and inadequate physical activity are strong risk factors (1). There has been an increase in the prevalence of type 2 diabetes across all socioeconomic classes for both men and women; however, this disease particularly affects older adults and minority individuals, with African Americans, Hispanics, and Native Americans being at greatest risk.

Although family history increases an individual's risk of type 2 diabetes, there is strong evidence that modifiable risk factors such as obesity and physical inactivity are the main non-genetic determinants of the disease. An estimated 26% of American adults are obese, based on a BMI of 30.0 or greater (4). There has been a 61% increase in the prevalence of obesity since 1991 (4), which may partially explain the increase in diabetes. Behavior modification is imperative in helping to decrease obesity and to prevent and manage diabetes. Many complications that might result from diabetes can be avoided or delayed with proper management. Results of research by Tuomilehto et al. provide insight into the area of behavior modification to manage diabetes (5). Those subjects that were in the intervention group were taught to manage their type 2 diabetes through behavior modifications such as weight reduction, decreasing intake of fat and saturated fat, and increasing fiber intake and physical activity. This significantly improved subjects waist circumference, and had a lower fasting plasma glucose concentration, plasma glucose concentration two hours after oral glucose challenge, and reduced serum insulin concentration at two hours after glucose challenge.

Since patients must deliver most of their own diabetes care, it is important to understand the factors that affect self-management behavior such as health attitudes and knowledge of treatment modalities (6). Patients' attitudes are greatly influenced by those

around them, especially by their primary health care giver. Dietrich interviewed seven type 2 diabetes patients and concluded that physicians' attitudes at the time of diagnosis were critical in patients' attitudes about the seriousness of diabetes and their subsequent self-management behavior (7).

Although the evidence does not support that low-income individuals have a greater incidence of type 2 diabetes than other groups, there is reason to be concerned that they may not get sufficient medical care and/or instruction/education to manage their disease due to limited economic resources, low education, and lack of health insurance. (52). It has also been documented that low-income individuals have increased prevalence of hypertension, cardiovascular disease, obesity, and poor diets that are associated with type 2 diabetes (29). Thus, increased emphasis on diabetes education for low-income individuals is needed among physicians, nutrition professionals, and federal and state programs that target low-income individuals.

Low-income individuals may not understand or follow the education provided to them for diabetes self-management, if that education does not take into account the patient's prior knowledge, understanding, beliefs, attitudes, and barriers (real or perceived). In order to design effective diabetes education programs for low-income individuals, it is imperative that developers/leaders be knowledgeable of those characteristics that have been shown to effect management of type 2 diabetes (5). However, there is a paucity of research regarding how members of this population group perceive diabetes and what they know, or do not know, about current self-care recommendations.

The purpose of the current study was to identify some of the characteristics of low-income adults that influence management of type 2 diabetes, including perceived knowledge, attitudes (feelings), and dietary and physical activity practices. A secondary purpose was to investigate the extent to which diabetes education/instruction had been provided to a sample of low-income adults enrolled in the Food Stamp Nutrition Education Program (FSNEP; 9) and the extent to which these individuals were following instructions provided by their physicians or other health-care professionals. Results of this study may be useful to nutrition and healthcare professionals, who provide

instruction to patients with diabetes, and to leaders of federally-funded nutrition education programs, such as FSNEP.

Methods

A cross-sectional survey design was used in the study, involving face-to-face, individual or small group interviews with subjects. The population studied was low-income adults who had type 2 diabetes and were enrolled in the Virginia FSNEP during the three-month period of February-March, 2002. Data were collected during March and April 2002. Confidentiality was maintained by using a pre-assigned identification number on each instrument, instead of subjects' names. The University Institutional Review Board approved the study for Research Involving Human Subjects. Each subject signed an informed consent form before data were collected.

Sample

A sample of 196 low-income subjects having type 2 diabetes was recruited from enrolled FSNEP clients throughout Virginia. Forty-nine FSNEP Program Assistants (PAs) were involved in recruiting subjects and served as interviewers in administering the survey instrument. Family Records previously collected on FSNEP participants were used to identify potential subjects for the study. During February 2002, PAs reviewed FSNEP Family Records and identified all clients who reported having diabetes. They also checked further with the clients to confirm that they had diabetes. Only those who were 16 years and older were considered as study subjects. Efforts were made to select those who had acquired diabetes as adults to eliminate those with type 1 diabetes.

PAs provided to their supervisor (five Area FSNEP Coordinators) the number of clients with diabetes within their caseload. The Area Coordinators developed a list showing the number of total enrolled clients for each PA and the number having diabetes. These lists were provided to the researchers. Area Coordinators were instructed to have the PAs select subjects to interview as follows: (a) If the PA had six or fewer clients with diabetes, then they were to interview all of them, (b) If they had more than six with diabetes, they were to randomly select only six to interview.

Intervention

The survey instrument was a questionnaire titled, *Attitudes, Knowledge, and*

Behavior Questionnaire for Diabetes Patients (hereafter, title shortened to Diabetes Patient Questionnaire for convenience). It was constructed by the researchers using parts of a previously designed instrument, the Diabetes Care Profile was designed at the Michigan Diabetes Research and Training Center by Fitzgerald et al (48).

The Diabetes Care Profile (DCP) is a questionnaire that was developed to assess patients' social and psychological factors related to diabetes and its treatment (48). Two unique studies were used to test the reliability and validity of the DCP. Reliability indicates whether the results are repeatable or reproducible and validity indicates whether the test measures what it is designed to measure, and whether the measured value agrees with the "true" value (53).

Each study used separate populations and methodology. For the first study, researchers administered the DCP to individuals with diabetes being cared for in a community setting. The DCP was initially self-administered. A trained interviewer subsequently reviewed the questionnaire with each patient to ensure that each question had been answered. Physiological measures were collected after the DCP was administered and the results were correlated with the DCP scale scores. The reliability of each DCP scale was determined by Cronbach's coefficient alpha calculated on standardized scores. Scale differences among the patients with type 1 diabetes, patients with type 2 diabetes using insulin and patients with type 2 diabetes not using insulin were determined using analysis of variance (F ratio $p \leq .01$) and Tukey's HSD (global alpha= .05). Correlations of the DCP scales to Glycosylated Hemoglobin levels were examined by pair wise Pearson correlations. Correlations of $\geq .20$ were considered supportive of validity (48).

In the second study, the DCP and several previously validated scales were administered to individuals with diabetes receiving care at an academic medical center (10). The three external scales were selected because they measure constructs similar to the DCP scales, except for the diabetes focus. The Social Provisions Scale assesses the perceived availability of social support. The Center for Epidemiologic Studies Depression Scale (CES-D) measures level of depression. The happiness and satisfaction scale measures feelings towards one's life. The reliability was determined by calculating Cronbach's coefficient alpha on each of the scales. To determine the relationship

between DCP responses and the three external, validated instruments, Pearson correlations were calculated. A correlation value of ≥ .30 was considered to be an acceptable level of reliability. Both the DCP and external instruments showed reliability with Cronbach coefficient scores ranging from .66 to .94. The researchers hypothesized that the DCP would correlate with external instruments measuring similar constructs. The Social Provisions Scale correlated at significant levels with support, social and personal factors, and positive and negative attitudes of the DCP (48).

In earlier studies (48), the DCP scales were examined for both construct validity and concurrent validity. Construct validity was determined by the ability of the DCP scales to differentiate among patient groups. It was assumed that, if the scales were valid, patient responses would differ by diabetes type and treatment. Concurrent validity of the DCP was assessed by comparison with an external, previously validated scale measuring a similar construct. Concurrent validity was tested by calculating correlations of the DCP scales with certain scales external to the DCP (48).

Results of both studies support the DCP's validity. The results of the comparisons indicate that the DCP scales obtain results that differ by diabetes type and treatment. For example, it was expected that the more severe the disease, the more difficulty patients would have in controlling their diabetes. Indeed, self-reported control problems were greatest for patients with Type 1 diabetes followed by patients with Type 2 diabetes using insulin. Furthermore, patients using insulin (a more intrusive self-care procedure than taking pills) reported a greater impact of diabetes on their social and personal lives. The DCP also showed sensitivity to differences among the three patient groups. The direction of score differences across the patient groups support the DCP's validity (10). It was concluded that the DCP is a reliable and valid instrument that is applicable to patients in both medical and community settings. The DCP provides specific information about factors that influence diabetes control, which cannot be obtained with more general measures.

Pilot Testing of Diabetes Patient Questionnaire

The Diabetes Patient Questionnaire was pilot tested by one of the investigators at a free medical clinic in Christiansburg, Virginia. The instrument was administered to nine low-income diabetes patients that were believed to be clients that would participate

in the actual study. The individuals were asked to comment on the clarity of questions and to give their suggestions on modifying questions on the instrument. Several modifications were made to the Diabetes Patient Questionnaire as a result of pilot testing. Terminology used in the instrument was kept simple since literacy is generally poor in the low-income population. The questionnaire was designed as an interview format and composed of three sections: attitudes, behaviors, and knowledge. A question was added to differentiate between those who are taking insulin or oral medications or neither to control their diabetes. Also, a question was added to ask subjects how long they have had diabetes. Analyses were conducted on the pilot data using SPSS 10.1.

Training on administration of the Diabetes Patient Questionnaire was conducted in two steps. First, the researchers trained the five Area EFNEP/FSNEP Coordinators who serve as supervisors of the PAs throughout the state. This training included the proper procedure for conducting interviews with subjects and completing the instrument, as well as ideas for training PAs on the procedures. In turn, each of the Area Coordinators trained PAs in her geographic area on conducting subject interviews in an unbiased manner and correctly completing the instrument**.**

Assessment

The clients were interviewed in one-on-one sessions by the PAs. Cue cards were used to show response categories for questions that had multiple answers. This was intended to help clients understand the questions and to aid them in selecting appropriate responses. The Program Assistants were instructed to mail to the researchers completed client questionnaires along with a copy of the demographic section of each subject's FSNEP Family Record. Phone numbers of the researchers were provided to PAs and subjects, in case they had a concern or question about the study.

Statistical Analysis

The information from the instruments was entered into a data set file by the principal investigator, using SPSS, Version 10.1 (50) and descriptive statistics were computed. Additional analyses were performed by an experienced statistician using SAS System, Release 8.2 for Microsoft Windows (51). Principal Component Analysis was

used to generate Eigenvalues (weighted mean variance scores) for the subjects as a total group and for Caucasians and African-Americans separately on seven factors measured by the following scales or questions:

a. physical activity level (scale formed by responses to Questions 20, 21, 22 and 24)
b. meal plan adherence (Question 12).
c. diabetes control scale (Question 6)
d. perceived knowledge scale (Question 8)
e. feelings toward diabetes scale (Question 9)
f. physical limitations scale (Question 10)
g. perceived barriers to regular exercise scale (Question 25)

The Eigenvalues were then used to compute correlations among the seven factors using Pearson's correlation procedure. T-tests were used to compare African-Americans and Caucasians using Eigenvalues for the seven factors**.** Univariate analysis was used to derive means, standard deviations, box plots, and histograms on the data.

Results

Data on subjects' responses to some of the questions on the Diabetes Patient Questionnaire are shown in Table 4. At the time of data collection, there were 4,241 clients enrolled in FSNEP. Four hundred and fifty-seven reported having type 2 diabetes, which is 10.8% of those, enrolled. If extrapolated for the whole year, there would be an estimated 738 FSNEP participants with type 2 diabetes.

The majority (44.8%) of the study sample resided in rural areas and towns of 10,000 people. Of the 193 subjects reporting race, 86 (43.9%) were Caucasian, 100 (51.0%) were African American, 2 (1.0%) were Hispanic, and 5 (2.6%) were Asian American. The mean age for the study was 62 years. Questionnaires were completed on 196 subjects (163 female 83.0% and 33 male 17%). For African Americans, the mean time since diagnosis was longer at 12.5 years (± 12.3) than for Caucasians (8.2 ± 5.6 years). During the year the study was conducted, the FSNEP population was composed of 82% female and 18% male, with 50 % of clients being Caucasian and 45% being African American over the age of 60.

Regarding use of medication and rating of overall health, 19 of 85 Caucasians (22.1%) and 42 of 98 (42%) African Americans were using insulin injections. Seventy of both the Caucasians (81.4%) and African Americans (73.7%) were using oral hyperglycemic medication. Regarding how they rated their health, 52.3% (n=45) of Caucasians and 50% (n=50) of African Americans believed their health was good or excellent.

Sixty-three percent of the total sample (n=124) had received diabetes education prior to the study. Regarding dietary recommendations to follow a meal plan, 76 of 86 (88.4%) Caucasians and 85 of 100 (85%) African Americans reported that they had been told to follow a meal plan by their health care provider. Fifty-five percent of the total sample said that they almost always or always followed dietary recommendations from their health care provider. In regard to whether or not they had been told to eat meals and snacks on a certain schedule, 60 of 73 (82.2%) Caucasians and 74 of 83 (89.2%) African Americans reported that they had been told to eat on a certain schedule. Almost 61% (n=101) reported that they had been told to weigh or measure their food and about 73%

(n=121) were told to use exchange lists to plan meals. Five of sixteen (31.3%) Caucasians and 9 of 28 (32.1%) African Americans did not follow a meal plan because they had never been told to do so.

Eighty-three percent of the study sample (n=163) had been told to exercise regularly, with 46.2% (n=42) having received that recommendation from a physician or nurse. About half of the Caucasians (42 of 85 = 49.4%) and African Americans (50 of 98 = 51.0%) said they exercised regularly. Of the 88 subjects reporting on type of exercise, most of the Caucasians (27 = 71%) and the African Americans (34 = 72.7%) chose walking as their exercise. Of the 91 subjects who reported frequency and length of exercise sessions, 64.1% of Caucasians (n=25) and 77.6% (n=38) of African Americans reported they exercised 3 or more times per week. Over 56% of Caucasians (n=22) and 46.9% (n=23) of African Americans reported participating in exercise for more than 30 minutes at a time. When the sample was asked whether they began to exercise as a result of diabetes, 66.7% (n=26) of Caucasians and 56.3% (n=27) of African Americans said that exercise had been a part of their life before they were diagnosed with diabetes. Only 38% (n=34) of the subjects began exercising because of their disease. The majority of African Americans (49 = 100.0%) and Caucasians (34 = 87.2%) said that they feel better when they exercise.

In Table 5, African Americans and Caucasians were compared on the following scales using t-tests with a level of $P \leq 0.001$: diabetes control, perceived knowledge of diabetes care, feelings towards diabetes, physical limitations, and current physical activity level. There were no significant differences between the two groups on any of the scales.

Table 6 lists data on comparisons of subjects, grouped by place of residence, using weighted mean variance scores on six factors associated with diabetes self-management (actual diabetes control, perceived knowledge, feelings, physical limitations, barriers to physical activity, and current physical activity level) . No significant differences were found among subjects grouped by place of residence on factors associated with diabetes self-management ($p \leq 0.001$). One interesting finding was that subjects living in Suburbs and Central Cities had negative variance scores indicating very low levels of diabetes control. The variance scores for those in the more rural areas

tended to have higher scores on diabetes control than those in Suburbs/Central Cities, though not statistically significant.

Correlations of factors involved in self-management of type 2 diabetes in low-income adults are presented in Table 7. A p-value of 0.001 was used to determine significance. When the scales were correlated with one another and other variables, several significant correlations were revealed.

(a) Participants' feelings toward their diabetes were negatively correlated with their health compared to prior year ($r = -0.31$, $p<0.0001$), meal plan adherence ($r = -0.28$, $p=0.0006$), diabetes control ($r = -0.48$, $p<0.0001$), perceived knowledge of diabetes ($r= -0.40$, $p<0.0001$), and physical limitations ($r= -0.26$, $p=0.0003$). As patients' health, meal plan adherence, diabetes control, and perceived knowledge declined, negative attitudes towards their diabetes increased.

(b) Self-rating of health compared to prior year was significantly correlated with meal plan adherence ($r=0.14$, $p=0.002$) and diabetes control ($r=-.27$, $p=0.0002$). Those patient's who had increased meal plan adherence were positively correlated with their health compared to one year ago. Patients' with decreased diabetes control were negatively correlated with declining health.

(c) Meal plan adherence was positively related to diabetes control ($r=0.40$, $p<0.0001$) and perceived knowledge of diabetes ($r=0.36$, $p<0.0001$). As patients' diabetes control and perceived knowledge of diabetes increases, so does meal adherence.

(d) Diabetes control was positively correlated with perceived knowledge of diabetes ($r = 0.37$, $p < 0.0001$) and physical limitations ($r = 0.28$, $p = 0.001$). Patients' who have more perceived knowledge and less physical limitations have better diabetes control.

Discussion

On gender, age, and race, the study sample was similar to the total FSNEP population, except that the percentage of African Americans was higher among the diabetes patients than among the general FSNEP population. This agrees with national data (1) indicating that African Americans are at greater risk than Caucasians for type 2 diabetes. The African American subjects also had diabetes longer (12 years vs. 8 years),

although their current mean age was the same as Caucasians. Thus the African American subjects had an earlier onset of diabetes than the Caucasians, which could be due to ethnic differences in diabetes risk and a higher rate of obesity among African Americans. On the other hand, the earlier diagnosis could be partially due to more intensive diabetes screening among African Americans (16,1).

A majority of the study subjects resided in rural areas and towns of 50,000. When subjects were grouped by place of residence and compared on factors associated with diabetes self-management, there were no significant differences between those living in rural and urban areas. This was surprising, as it was anticipated before the study that diabetes patients living in rural areas would have limited access to diabetes education. However, results of the study indicate that the availability and access to diabetes education is about the same in rural and urban areas of Virginia. About two-thirds of all the subjects had received diabetes education before they enrolled in the study.

The study did not reveal substantial differences in African Americans and Caucasians regarding recommendations they had received on dietary practices. More than 80% of all subjects had been advised to follow a meal plan, eat meals and snacks on a certain schedule, weigh or measure their food, and use exchange lists in planning meals. About half the subjects reported that they were following recommended dietary practices almost always or always.

A physician or nurse had more frequently provided exercise recommendations than dietitians or others. Forty-nine percent of study's participants were physically active, but were not meeting the recommended activity guideline published by the American College of Sports Medicine, which is 30 minutes of physical activity on most

days of the week (28). Almost half of the participants exercised two times per week or less, and almost a half did not exercise for 30 minutes.

When African Americans and Caucasians were compared on factors associated with diabetes control, there were no significant differences found between the two groups on health compared to prior year, meal plan adherence, diabetes control, perceived knowledge of diabetes care, feelings towards diabetes, physical limitations, perceived barriers to exercise, and current physical activity level. When subjects were grouped by place of residence and compared on the same factors no significant differences were found. An interesting finding is that subjects living in urban areas had negative variance scores indicating very low levels of diabetes control. This is surprising since the authors had expected that those living in more urban areas would have better diabetes control because of better access to health care. This issue needs to be further investigated as no reports were found in the literature describing the relationship between diabetes self-management and place of residence.

Participants' feelings toward their disease were negatively correlated with their health compared to one year ago, diabetes control, and perceived knowledge of diabetes care. These significant correlations suggest that one's health, knowledge about one's disease and ability to control one's diabetes, are interconnected and play an important role in how that person generally feels about diabetes and how it affects their life.

The current findings show a positive correlation between current physical activity level and feelings towards diabetes. Tessier et al. (18) concluded that with regular exercise there is an improvement in attitudes, without the provision of any specific intervention to improve attitudes toward diabetes.

Similar to the present study, Fitzgerald et al. (48) found that African Americans and Caucasians do not differ greatly on diabetes control, feelings towards diabetes, and physical limitations. Both ethnic groups seemed to deal with their type 2 diabetes in a similar manner. Those who perceived they had more knowledge about diabetes tended to have better control, as well as more positive feelings towards their disease. This correlates with similar findings of Tuomilheto et al. (5) indicating that subjects with more knowledge of their disease were able to better manage their diabetes.

Meal plan adherence was positively correlated with diabetes control and perceived knowledge. This is not surprising since research has shown that with proper meal planning and food selection, diabetes control generally improves (14,26). The authors had expected to find that greater perceived knowledge would correlate with diabetes control.

The results of this study indicate that there is no significant difference between low-income Caucasians and African Americans on various factors associated with self-management of type 2 diabetes. Presumably, the two groups would be similar regarding their need for education/instruction to manage type 2 diabetes. These findings are important to consider in the development of diabetes education programs and materials targeting low-income individuals.

Applications and Future Research

Future research should include testing of actual knowledge about diabetes and how it relates to diabetes control. One of the limitations of the current study is that we tested only perceived knowledge. Thus, we can only assume that if the subject perceived they had good knowledge of diabetes, they actually did have that knowledge. Another

issue we did not explore was whether or not there is a difference between subjects on insulin and oral medication and, regarding diabetes control factors.

The results from this study will be useful in developing diabetes education materials for state agencies. Diabetes education should focus on improving dietary practices and increasing regular physical activity for better control of diabetes. The focus of diabetes education does not need to differ based on whether or not the target audience is mostly African American or Caucasian or rural vs. urban. However, there may be other differences in these audiences that would need to be addressed by educational programs, which were not investigated by this study.

Table 4. Summary of Subjects' Responses on Selected Items of the *Attitudes, Knowledge, and Behavior Questionnaire for Diabetes Patients* by Race

	Caucasians N = 86			African-Americans N= 100			Total N = 196[a]		
Variable/Questionnaire Item[b]	No	%	Mean ± SD	No	%	Mean ± SD	No	%	Mean ± SD
Residence:	85		NA	100		NA	194		NA
a. Rural and Towns ≤10,000	50	58.8		36	36.0		87	44.8	
b. Towns/cities 10,000-50,000	20	23.5		16	16.0		38	19.6	
c. Cities & Suburbs >50,000	15	17.6		48	48.0		69	35.6	
Current Age:			61.26 ± 14.3			62.78 ± 14.7			61.98 ± 14.6
a. Less than or equal to age 44	12	14.1		13	13.0		27	14.1	
b. Age 45 - 64	32	37.6		34	34.0		67	34.9	
c. Age 65 and older	41	48.2		53	53.0		98	51.0	
[c]Q1a. Years have had diabetes:			8.21 ± 6.71			12.46 ± 12.29			10.26 ± 10.1
Q1b. Uses Insulin:	85		NA	98		NA	193		NA
Yes	19	22.1		42	42.0		64	32.0	
No	66	76.7		56	56.0		129	65.8	
Q1c. Takes hyperglycemic pills:	84			95		NA	188		NA
Yes	70	81.4	NA	70	73.7		147	78.2	
No	14	16.3		25	26.3		41	21.8	
Q2. Rating of overall health:	85		2.58 ± 0.78	100		2.56 ± 0.70	195		2.58 ± .737
a. Excellent	3	3.5		3	3.0		6	3.1	
b. Good	42	48.8		47	47.0		92	47.2	
c. Fair	28	32.6		41	41.0		74	37.9	
d. Poor	12	14.0		9	9.0		23	11.8	
Q7. Has received diabetes edu. :	85		NA	99		NA	194		NA
Yes	56	65.1		63	63.6		124	63.3	
No	27	31.4		28	28.3		60	30.6	
Cannot remember/Not sure	2	2.3		8	8.1		10	5.1	
Q11. Been told to follow a meal plan by health-care provider:	86		NA	100		NA	196		NA
Yes	76	88.4		85	85.0		170	86.7	
No	10	11.6		14	14.0		25	12.8	
Can't remember/Not sure	0	0		1	1.0		1	0.5	
Q12. Follows dietary recommendations:	68		3.59 ± 0.89	73		3.64 ± .788	150		3.59 ± .852
a. Never/ Almost never	5	7.4		3	4.1		9	6.0	
b. Sometimes	25	36.8		28	38.4		58	38.7	
c. Almost always/ Always	38	55.9		42	57.5		83	55.3	

	Caucasians N = 86			African-Americans N= 100			Total N = 196[a]		
Variable/Questionnaire Item[b]	No	%	Mean ± SD	No	%	Mean ± SD	No	%	Mean ± SD
Q13. Been told to eat meals & snacks on certain schedule:	73		NA	83		NA	165		NA
Yes	60	82.2		74	89.2		139	84.2	
No	9	12.3		9	10.8		22	13.3	
Can't remember/Not sure	4	5.5		0	0.0		4	2.4	
Q14. Told to weigh/measure food:	74		NA	83		NA	166		NA
Yes	49	66.2		47	56.6		101	60.8	
No	21	28.4		34	41.0		59	35.5	
Can't remember/Not sure	4	5.4		2	2.4		6	3.6	
Q15. Been told to use exchange lists/food groups to plan meals:	74		NA	83		NA	166		NA
Yes	55	74.3		62	74.7		121	72.9	
No	13	17.6		17	20.5		35	21.1	
Can't remember/Not sure	6	8.1		4	4.8		10	6.0	
Q16. Reasons not following meal plan:	16			28			45		
a. Never been told to do so	5	31.3		9	32.1		15	33.3	
b. Did not understand instruction	0	0.0		1	3.6		1	2.2	
c. Can't afford	3	18.8		1	3.6		4	8.9	
d. Don't see need	1	6.3		0	0.0		1	2.2	
e. Too hard or complicated	1	6.3		5	17.9		6	1.3	
f. Other	3	18.8		1	3.6		4	8.9	
Q17. Been told to exercise regularly:	85		NA	100		NA	195		NA
Yes	70	81.4		84	84.0		163	83.2	
No	13	15.1		15	15.0		29	14.8	
Cannot remember/Not sure	2	2.3		1	1.0		3	1.5	
Q18. Exercises on regular basis:	85		NA	98		NA	193		NA
Yes	42	49.4		50	51.0		95	49.2	
No	43	50.6		48	49.0		98	50.8	
Q19. Current physical activities:	38		NA	47		NA	88		NA
(a) Walking	27	71.1		34	72.3		64	72.7	
(b) All Other Activities	10	26.3		10	21.3		21	23.9	
Q20. Phys. activity frequency:	39		3.64 ± 1.66	49		3.94 ± 1.49	91		3.79 ± 1.56
(a) 1-2 times a week	14	35.9		11	22.4		26	28.6	
(b) 3-5 times a week	13	33.3		19	38.8		33	36.2	
(c) More than 5 times a week	12	30.8		19	38.8		32	35.2	
Q21. Time spent in phys. act.:	39		3.90 ± 1.31	49		4.14 ± 1.37	91		4.02 ± 1.33
a. Less than 15 minutes	1	2.6		6	12.2		7	7.7	
b. 15 to 30 minutes	16	41.0		20	40.8		37	40.7	
c. More than 30 minutes	22	56.4		23	46.9		47	51.6	

	Caucasians N = 86			African-Americans N= 100			Total N = 196[a]		
Variable/Questionnaire Item[b]	No	%	Mean ± SD	No	%	Mean ± SD	No	%	Mean ± SD
Q22. Began exercising as result of diabetes:	39			48			90		
a. Exercise/phys. activity was part of life before diabetes onset	26	66.7		27	56.3		54	60.0	
b. Started exercising because of diabetes	12	30.8		20	41.7		34	37.8	
c. Not engaged in exercise due to diabetes	1	2.6		1	2.1		2	2.2	
Q23. Who instructed to exercise:	39		NA	49		NA	91		NA
(a) No one gave instructions	8	20.5		14	28.6		22	24.2	
(b) Physician or Nurse	17	43.6		23	46.9		42	46.2	
(c) Dietitian	4	10.3		2	4.1		6	6.6	
(d) Other	4	10.3		1	2.0		17	18.7	
Q24. Feels better when exercise:	39		NA	49		NA	90		NA
Yes	34	87.2		49	100.0		84	93.3	
No	5	12.8		0	0.0		6	6.7	

[a]10 participants included in the total were from ethnic groups other than Caucasian or African-American.
[b]Questionnaire items not included here are covered in another table.
[c]Number of question in the *Attitudes, Knowledge, and Behavior Questionnaire for Diabetes Patients.*
[d]41 subjects gave answers not possible under current insurance systems (i.e. having Medicare and Medicaid at the same time)

Table 5. Relationship of Subjects' Mean Weighted Scores for Factors Associated with Type 2 Diabetes Control Among Low-Income Adults (N=196)

	[a]Caucasians n = 86	[a]African-Americans n = 100	
Factors Measured	Weighted Variance Score Mean ± SD	Weighted Variance Score Mean ± SD	[a]P-Values for t-tests
Diabetes Control (Q6)	-0.051 ± 1.31	0.016 ± 1.24	0.7233
Perceived Knowledge of Diabetes Care (Q8)	0.234 ± 1.91	-0.148 ± 2.63	0.2963
Feelings Toward Diabetes (Q9)	0.140 ± 1.84	-0.157 ±1.69	0.2639
Physical Limitations (10)	-0.182 ± 2.01	0.162 ± 2.01	0.2582
Perceived Barriers to Physical Activity (Q25)	-0.215 ± 1.57	0.128 ± 1.47	0.2943
Current Physical Activity Level (Q20, 21, 22, 23, 24)	0.030 ± 1.24	-0.040 ± 1.22	0.7916
Health Compared to Prior Year (Q3)	3.15 ± 1.02	3.39 ± 0.95	0.1012
Meal Plan Adherence (Q12)	3.59 ± 0.88	3.64 ± 0.79	0.6983

[a]African-Americans and Caucasians were compared using t-tests, with the level of significance
set at P≤ 0.01.

Table 6. Relationship of Subjects' Mean Weighted Scores for Factors Associated with Diabetes Self-Management based on Place of Residence (N=196)

Factors Measured	[a]Weighted Variance Scores Mean ± SD				[b]P-Values
	Farm or Rural	Town (10,000 - 50,000)	Suburbs of Cities >50,000	Central Cities >50,000	
Diabetes Control (Q6)	0.03 ± 1.17	0.11 ± 1.53	-0.20 ±0.96	-0.04 ± 1.47	0.7861
Perceived Knowledge of Diabetes Care (Q8)	-0.13 ± 2.17	1.06 ± 1.74	-0.36 ± 2.72	-0.31 ± 2.58	0.0502
Feelings Toward Diabetes (Q9)	-0.05 ± 1.79	0.01 ± 1.92	0.35 ± 1.51	-0.16 ± 1.81	0.6648
Physical Limitations (10)	0.00 ± 1.97	-0.17 ± 2.31	-0.11 ± 2.15	0.20 ± 1.70	0.8805
Perceived Barriers to Physical Activity (Q25)	-0.01 ± 1.88	0.16 ± 1.36	-0.22 ± 1.27	0.13 ± 1.54	0.8485
Current Physical Activity Level (Q20, 21, 22, 23, 24)	-0.21 ± 1.29	0.31 ± 0.98	0.42 ± 1.49	0.11 ± 1.00	0.3103

[a]Mean set at zero and these are variations ± zero.

[b]T-tests were used to compare subjects on various factors involved in diabetes self-management, using a significance level of P< .001.

Table 7. Correlation of Factors Involved in Self-Management of Type 2 Diabetes

	Health Compared to Prior Year (Q3) r-value p-value sig. # subj.	Meal Plan Adherence (Q12) r-value p-value sig. # subj.	Diabetes Control (Q6) r-value p-value sig. # subj.	Perceived Knowledge of Diabetes Care (Q8) r-value p-value sig. # subj.	Feelings Toward Diabetes (Q9) r-value p-value sig. # subj.	Physical Limitations (Q10) r-value p-value sig. # subj.	Perceived Barriers to Physical Activity (Q25) r-value p-value sig. # subj.	Current Physical Activity Level (Q20, 21, 22, 23, 24) r-value p-value sig. # subj.
Health Compared to Prior Year (Q3)	NA	0.14 0.0908 150	0.27 0.0002 *** 188	0.14 0.0650 175	-0.32 <.0001 *** 188	0.13 0.0890 186	-0.04 0.7217 94	-0.11 0.2883 89
Meal Plan Adherence (Q12)		NA	0.41 <.0001 *** 144	0.36 <.0001 *** 144	-0.28 0.0006 *** 144	0.09 0.2638 143	-0.03 0.8195 64	-0.26 0.0229 77
Diabetes Control (Q6)			NA	0.37 <.0001 *** 169	-0.48 <.0001 *** 180	0.28 0.0001 *** 178	0.19 0.0684 90	-0.18 0.1046 86
Perceived Knowledge of Diabetes Care (Q8)				NA	-0.40 <.0001 *** 171	0.11 0.1560 168	-0.06 0.5651 89	0.01 0.9189 78
Feelings Toward Diabetes (Q9)					NA	-0.26 0.0003 *** 182	-0.24 0.0189 92	0.20 0.0667 85
Physical Limitations (Q10)						NA	0.26 0.0121 90	-0.25 0.0224 86
Perceived Barriers to Physical Activity (Q25)							NA	NA
Current Physical Activity Level (Q20, 21, 22, 23, 24)								NA

***p≤0.001

Chapter 5

Availability and Accessibility of Community Diabetes Education Programs

Health insurance coverage reported by low-income diabetes patients. Table 8 shows data on responses to questions posed to 196 subjects about insurance coverage and if patients knew whether or not their insurance covers diabetes education. Of the 185 who reported, 65 (35.1%) said their health insurance covered diabetes education, 33 (17.8%) said no, and 87 (47.1%) said they were not sure if their health insurance covers diabetes education. Forty-one subjects gave responses not possible under current insurance systems, such as indicating they have both Medicare and Medicaid. Of the 154 who reported, 29 (18.8%) had health insurance, 51 (33.1%) had Medicare, and 29 (18.8%) had Medicaid. Twenty-six (16.9%) had Medicare plus health insurance, 2 (1.3%) had Medicaid plus insurance, and 17 (11.0%) did not have any insurance coverage.

It was surprising that less than one-fifth had no health insurance coverage, as a high proportion of low-income individuals nationwide have no coverage (53). Since 70% of the subjects reportedly had either Medicare or Medicaid, they would have coverage for diabetes education. In contrast, only 38% (65 of 185) indicated they knew their insurance covered diabetes education. Low-income individuals with diabetes need to be informed of the fact that Medicare and Medicaid provide coverage for diabetes education.

Diabetes education practices reported by health agencies. The results from the CDES-I and CDES-II in Table 9 provide a look at what different health agencies are offering for diabetes education in Virginia. Hospitals were the main health agency to fill out CDES-II. Most diabetes education conducted by extension is delivered through a

combination of methods, including group classes, individual counseling sessions, phone calls or e-mail messages, and publications.

A little over half of the health agencies said that they would be interested in working with Extension in conducting group diabetes education classes. If resources are available, Extension might want to pursue collaborating with health agencies to provide diabetes education to low-income patients.

The CDES-II was completed by 59 health agencies from around the state. Almost all of the responding health agencies offer diabetes diagnosis and treatment for adults. Of the agencies surveyed, 94.6% said that they provide diabetes counseling and education to their own patients. About 64% said they provide diabetes education for others that are not their patients. Thirty-eight out of 59 health agencies said that they offer diabetes counseling and education classes covering topics such as use of insulin or hyperglycemic medications, diet, exercise, foot care, and what to do if blood sugar is too high or too low. About 59% (34 of 58) health agencies conduct activities to promote prevention of diabetes including, health fairs, classes for at risk people, newsletters, and newspaper articles.

When health agencies were asked about whether or not they were including low-income individuals in their diabetes classes, 86.8% said yes, but 25.5% did not know how many of their class participants were low-income. Half of the 28 agencies reporting said they charge a fee for diabetes education. Thus, cost may be a problem for those low-income patients who are not on Medicare or Medicaid. Based on responses from these agencies, it appears that there is a substantial amount of diabetes education being offered. However, it is still unknown whether or not low-come individuals attend these classes or

would do so if they knew about the classes. A common problem among low-income individuals is lack of transportation, which could be a barrier to attendance. In the current study we did not assess whether or not transportation was a barrier for low-income diabetes patients.

Table 8. Summary of Insurance, Medicare, and Medicaid Coverage and Rating of Health of Low-income Diabetes Patients by Race

	Caucasians N = 86			African-Americans N= 100			Total N = 196[a]		
Variable	No	%	Mean ± SD	No	%	Mean ± SD	No	%	Mean ± SD
Q4. Type Insurance Coverage:[b]	82		NA	80		NA	154		NA
a. Health Insurance	15	18.3		14	17.5		29	18.8	
b. Medicare	19	22.4		30	37.5		51	33.1	
c. Medicaid	10	12.2		18	22.5		29	18.8	
d. Do not have any of these	7	8.5		7	8.8		17	11.0	
e. Health Insurance & Medicare	15	18.3		10	12.5		26	16.9	
f. Health Insurance & Medicaid	16	19.5		1	1.3		2	1.3	
Q5. Insurance covers diabetes education:	71		NA	99		NA	185		NA
Yes	27	38.0		63	63.6		65	35.1	
No	2	2.8		28	28.3		33	17.8	
Not sure/Don't know	42	59.2		8	8.1		87	47.1	

[a]10 participants included in the total were from ethnic groups other than Caucasian or African-American.
[b] 41 subjects gave answers not possible under current insurance systems were not included in Q12 (i.e. having Medicare and Medicaid at the same time)

Table 9. Summary of Diabetes Education Being Provided by Health Agencies Throughout Virginia (N= 62)

	Community Diabetes Education Survey I & II		
Variable	**No**	**%**	**Mean ± SD**
QI-3a Health Agencies potentially providing diabetes diagnosis and treatment in 16 †HPDs surveyed, with those responding to the questionnaire.	136 with 59 responding		
QI-3b Health Agencies completing the questionnaire	59		
a. Hospitals	19	30.6	
b. Clinic	10	16.1	
c. Health Department	7	11.3	
d. Physician's Office	7	11.3	
e. Non-Specified	16	25.8	
QI-4 Frequency of Diabetes Edu in 16 HPD's	14		
a. None or < 1 time per year	7	50.0	
b. 1-3 times yearly	4	28.6	
c. 4-6 times yearly	1	7.1	
d. 6-9 times yearly	2	14.3	
e. 10 or more times a year	0	0.0	
QI-5a # of individuals involved in any type of diabetes education by Extension in the past year	565		62.8 ± 57.05
QI-5b Delivery Method	8		
a. Group Classes	0	0.0	
b. Individual counseling session(s)	0	0.0	
c. Phone or e-mail	0	0.0	
d. Provided handouts only	1	12.5	
e. Other	7	87.5	
‡QII-1 Does your Health Agency provide diabetes diagnosis and treatment for adults?	59		
a. Yes	51	86.4	
b. No	8	13.6	
QII-2 # of Diabetes Patients Served per year			791.1 ± 1192.09
QII-3 Does your Health Agency provide diabetes counseling and education for your own patients?	56		
a. Yes	53	94.6	
b. No	3	5.4	
QII-4 Does your Health Agency provide diabetes counseling and education for others (not your own patients)?	59		
a. Yes	38	64.4	
b. No	21	35.6	
QII-5 Do you provide group classes on diabetes education?	59		
a. Yes	30	50.8	
b. No	29	49.2	

QII-6 Topics are covered in group diabetes education classes	30		
a. Use of insulin or other medications	0	0	
b. Diet or eating pattern	0	0	
c. Physical activity or exercise	1	3.3	
d. Foot care	0	0	
e. What to do if blood sugar too high or low	1	3.3	
f. All of the above	25	83.3	
g. Diet and exercise	3	10.0	
QII-7 Is there a fee for the classes?	28		
a. Yes	14	50.0	
b. No	14	50.0	
QII-8 Does your Health Agency conduct education on prevention of diabetes?	58		
a. Yes	34	58.6	
b. No	24	41.0	
QII-9 What efforts are being done for prevention of diabetes?	36		
a. Classes for at risk individuals			
b. Health Fairs	1	2.8	
c. Newspaper articles	5	13.9	
d. Newsletters	1	2.8	
e. Messages/programs on TV	1	2.8	
f. Messages/programs on Radio	1	2.8	
g. Other	0	0.0	
	27	75.0	
QII-10 Are you including low-income people in your diabetes education program?	53		
a. Yes	46	86.8	
b. No	7	13.2	
QII-11 About how many of class participants are identified as (appear to be) low-income?	47		
a. ¼ or less			
b. ¼ to ½	7	14.9	
c. ½ to ¾	15	31.9	
d. ¾ or more	3	6.4	
e. Don't know	10	21.3	
	12	25.5	
QII-12 Would you like to work with Extension to offer group diabetes education classes?	56		
a. Yes	31	55.4	
b. No	9	16.1	
c. Would like further information	16	28.6	

*QI= Community Diabetes Education Instrument Part I
†HPD = Health Planning District; The state is divided into 22 HPDs.
‡QII= Community Diabetes Education Instrument Part II

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Appendix A

E-mail Attachment to N&W Agents about revised CDES forms.
(date)
Dear Nutrition and Wellness Agents:
John Paul and I have finally finished the forms and instructions that go with the "Diabetes Study" that we are conducting. We hope all of you are willing to participate, as this study will provide data that are critical to a grant proposal, with which we hope to obtain funds for implementing diabetes education through VCE.

Attachments include two forms that you are being asked to complete, along with a set of instructions for Part II:
Part I: Community Diabetes Education Survey (one to be completed on each PD);
Part II: Community Diabetes Education Survey for Individual Health Agencies;
Letter to Go With Part II Survey, if mailed to individual agencies

We have revised these forms to address many of the concerns you voiced during the N&W In-service session on January 31. For example, we have been able to obtain a list of all the Registered Dietitians in the state and are no longer asking you for this information on your PD. In fact, we plan to provide information to you regarding registered dietitians (RDs) and certified diabetes educators (CDEs) in your Planning District.

Please complete the following steps:

1. **Send a message to rubycox@vt.edu and let me know if you are willing to participate.**
2. **If yes, Please look over the two survey forms and the instructions that are attached to this e-mail.**
3. **Proceed to complete Part I: Community Diabetes Education Survey on your PD and return to me by March 15. Please note that Area Coordinators will provide you with the information for Questions 1 and 2.**
4. **Proceed to make arrangements to complete Part II on 10 or fewer hospitals, health departments, and medical clinics in your PD. Please read the instructions before beginning. Contact me if you want to do sampling to limit the number of agencies that you survey.**
5. **Please note that the Part II Survey can be completed as a phone questionnaire OR can be mailed to each agency contact.**
6. **If you decide to mail Part II Survey to the agencies, do the following:**
   - **A. ADD your name and address to the bottom of the Part II form,**
   - **B. Contact all agencies in advance to determine who to send the questionnaire to;**
   - **C. Personalize the attached letter for each agency by adding the agency name, contact and address and your name and return address. Print original copies on VCE letterhead for each agency.**

7. **If you decide to complete your surveys by phone, we have an alternate form (in table format) that we can provided to you for ease in recording. Please send an e-mail to rubycox@vt.edu, if you want this form.**

8. Of course, you can also complete the Part II Survey by visiting agency contacts in person. This has the advantage of giving you a chance to get acquainted with the agency person for use in later collaborative efforts.

Thanks in advance for your involvement in this effort.
Sincerely,

Ruby H. Cox, PhD, RD
Associate Professor
Department of Human Nutrition, Foods, and Exercise
102 Wallace Annex, Virginia Tech
Blacksburg, VA 24061-0228
PHONE: 540-231-7156; FAX 540-231-7576; rubycox@vt.edu

Part I: Community Diabetes Education Survey
(Health Planning District Information)

Date Form Completed: _____

Name of Agent/Coordinator Completing Form: _____

What is the Health Planning District covered by this Survey? _____

Please list the counties and independent cities covered by this survey:

_____

_____

Client Information

Obtain the following information from EFNEP/SCNEP Area Coordinators who supervise the Program Assistants in your health-planning district (PD).

1. What is the **current total number** of enrolled EFNEP and SCNEP adult clients in your PD? _____ enrolled clients

2. What is the current number of EFNEP and SCNEP adult clients in your PD that have Type 2 Diabetes?

_____ have diagnosed diabetes

To complete Question 3, you need the *Education Recognition List* from (American Diabetes Association). This was provided to you during the recent N&W In-service Training (i.e. on 01-31-02). If you cannot locate your copy, please send an e-mail to rubycox@vt.edu with your fax number, and you will be sent a faxed copy.

3. Using the *Education Recognition List* and a phone book, please identify (using high-lighter pen) all the health/medical agencies in your PD that **might be** providing diagnosis and treatment of diabetes? (This includes hospitals, health departments, and medical clinics). **Please record the total number in the blank below.**

_____ **(If this number is greater than 10, please contact Ruby Cox at rubycox@vt.edu to determine if sampling should be done and how the sample should be drawn in a random manner).**

By March 28, 2002, you are asked to complete the form ***Part II: Community Diabetes Education Survey for Hospitals, Medical Clinics, and Health Agencies*** on up to10 agencies that provide diabetes care. The main goal is to obtain information on

diabetes education that is already being provided by health care institutions (hospitals, clinics, etc.) in your PD.

4. In your PD or unit, how often has any type of diabetes education been provided by you or another **Extension employee**, in the past five years? (check one please)

None or Less than 1 time a year	1 to 3 times yearly	4– 6 times yearly	6 – 9 times yearly	10 or more times a year

5. If some diabetes education has been offered by Extension in the 12 months in your PD, please respond to Questions I and II below

(If diabetes education <u>has not</u> been provided in past 12 months, you are finished with Part I of this survey. Please return to Ruby Cox at the address below.

I. How many individuals were involved in any type of diabetes education or counseling provided by Extension in your PD in the past 12 months?

_____ individuals

II. What delivery method was used? (Check all that apply)

A. _____ Group Class(es)

B. _____ Individual counseling session(s)

C. _____ Phone or e-mail communication

D. _____ Provided handouts only

E. _____ Other (please specify method used)

_____

By March 15, 2002, Please mail this completed survey to:

Ruby H. Cox
102 Wallace Annex (0228)
Blacksburg, VA 24061

If completed in ink, you may FAX this form to Ruby Cox at: 540-231-7576.

Once the following information is entered on this form by the researchers, a copy will be provided to each Nutrition and Wellness Agent.

To be completed by researchers at VT:

# of RD's in Health Planning District:_____

# of CDE's in Health Planning District:_____

February 11, 2001

(Name of contact and

agency address here)

Dear Diabetes Program Contact:

Enclosed is a questionnaire titled *Part II: Community Diabetes Education Survey for Individual Hospitals, Medical Clinics, and Health Agencies*. As mentioned to you (or your co-worker) in a recent phone conversation), Nutrition and Wellness Specialists and Agents with the Virginia Cooperative Extension (VCE) are conducting a study to determine what educational efforts are currently in place for adults who have type 2 diabetes. We are especially interested in educational efforts that are designed to help adults better manage their diabetes by learning how to plan meals and snacks, purchase food at the grocery store, select foods in a restaurant, prepare food in a healthy manner, and participate in recommended physical activity.

The purpose of this study is to gather data that can aid VCE Specialists and Agents in determining how we might support the medical community in providing appropriate dietary and physical activity education for the growing numbers of individuals who have type 2 diabetes. Our intent is to support, not replace, educational efforts of physicians, registered dietitians, and certified diabetes educators.

This study has been approved by the Institutional Review Board, Office of Research Compliance, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, 24061. Any written or oral reports on this study will not identify names of individual agencies or representatives that provide information to us.

Please complete the enclosed questionnaire and return to me by **March 28, 2002, at the address below.** If there is another person in your agency who could best answer the questions, please pass the questionnaire onto that person.

If you have questions about this study, you may contact Ruby H. Cox, PhD, RD, Department of Human Nutrition, Foods, and Exercise, Virginia Tech, at this toll free number:
1-888-814-7627.

Sincerely yours,

_____
VCE Nutrition and Wellness Agent
(put return address here)

Enclosure

Agency Informed Consent
for Research Involving Human Subjects

Title of Project: Type 2 Diabetes in EFNEP and FSNEP clients in Virginia

Those Conducting the Study:

John Paul Carpenter, Virginia Tech Graduate Student Phone: 540-231-2488
Dr. Ruby H. Cox, State EFNEP/SCNEP and Faculty Member Phone: 540-231-7156

Dear_____
(Name of Respondent)

You are invited to take part in a study to assess the extent to which diabetes education is available and easily accessible to low income adults in Virginia. If you are interested in participating after reading this entire document, you are asked to sign and date the designated place at the end of the document. The purpose of this informed consent is **to protect the rights of you and your agency. It does not obligate you to continue to participate, or to do anything that you do not wish to do.**

I. Purpose of Research

The purpose of the study is to assess the extent to which diabetes education is:

- Available and easily accessible to adults in Virginia who have limited incomes.
- Assess how health institutions are reaching out to low-income individuals.

Results will be used to see if there is a need for Cooperative Extension to provide better diabetes education, especially in the Expanded Food and Nutrition Education Program (EFNEP) and the Smart Choices Nutrition Education Program (SCNEP).

II. Study Procedures

1. This study will include health institutions in Virginia that provide diabetes care, or diabetes education, or both.

2. You have been asked to participate due to the following:
   a. You are a currently on a list from the ADA that provides diabetes education.
   b. You are an agency believed to provide medical services on diabetes.

3. As a participant in this study, you will be asked to complete the following study

activities:

a. To allow a Virginia Cooperative Extension (VCE) Nutrition and Wellness Agent to interview with you by phone or in person, or you are being asked to complete a self-administered questionnaire.

b. Answer questions regarding your health institution's diabetes patient care and education.

4. Dr. Ruby Cox or John Paul Carpenter will be available by phone to answer questions. You can also call this Toll Free number 1-888-814-4627 between the hours of 9:00 AM – 5:00 PM Monday – Friday. If you call and get a recording, please leave your name, phone number, and a time that you can be reached. Someone will return your call.

III. Risks

There are no perceivable risks associated with participating in this study.

IV. Benefits of the Study

- Advantages to you will include the opportunity to share what your health institution is doing to serve those with diabetes in the community.
- There is no promise of benefits being made to encourage your participation in this study.

V. Confidentiality

- Only you, the investigators and the interviewers of this study (VCE Nutrition and Wellness Agents) will be allowed to see your institution's information.
- At no one time will the researchers release individual information about your health institution to anyone other than the above stated individuals, without your written consent.
- Overall results, without identification of the participating health institution, will be combined in a report for others to see. Your health institution's identity will not be revealed.

VI. Compensation

There will be no payment for participating in this study.

VII. Freedom to Withdraw

You are free to withdraw from this study at any time without penalty. If at anytime you feel uncomfortable with a question, you do not have to answer that question.

VIII. Approval of Research

This research project has been approved, as required, by the Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic Institute and State University and the Department of Human Nutrition, Foods and Exercise.

IX. Subject's Responsibilities

I voluntarily agree to participate in this study. I have the following responsibilities:

- I will answer the questions as accurately and honestly as possible.
- If I do not understand a question or directions, I will ask the Investigator or Nutrition and Wellness Agent, or call the phone numbers provided for help.

IX. Subject's Permission

I have read and understand the Informed Consent and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent for participation in this project.

If I participate, I may withdraw at anytime without penalty. I agree to abide by the rules of this project.

_____ _____
Signature of Respondent Date

Name of Agency_____
Phone Number of Respondent: _____

_____ _____
Signature of Interviewer Date

Should I have any questions about this research or its conduction, I may contact:

John Paul Carpenter (540) 231-2488
Investigator, Virginia Tech Phone

Ruby H. Cox, PhD (540) 231-7156
Associate Professor-HNFE Phone
102 Wallace Annex
Blacksburg, VA 24061-0228

David M. Moore (540) 231-4991
Chair, IRB Phone
Office of Research Compliance
Research & Graduate Studies

Instructions for Part II: Community Diabetes Education Survey for Hospitals, Medical Clinics, and Health Agencies.

These instructions are intended to help you use the survey form, *Community Diabetes Education Survey for Hospitals, Medical Clinics, and Health Agencies.* This format is intended for recording information obtained by telephone interviews, in-person interviews, or by mail on diabetes education being provided by hospitals, medical clinics, and health agencies. **This form may be mailed to the agency, but should be addressed to a specific person, identified as having information about that agency's diabetes education.**

Before using this form, you will need to identify the person at the hospital, medical clinic or healthy agency that can provide information on that agency's diabetes education. This is likely to be a dietitian, nurse or some other health-care provider who works with the diabetes clinic.

Please read and adhere to the following instructions in completing each question of the *Community Diabetes Education Survey for Hospitals, Medical Clinics, and Health Agencies.*

Agency Contact Information.

1. Using the attached list, phone directories, or other resources, record the name of the hospital, medical clinic, and/or health/medical agency in your planning district that might be providing diabetes education. Include large-group-practices of physicians (at least 3 physicians), if you have reason to believe they provide substantial care for those with diabetes. Record the name of the agency, clinic, etc. and phone number in pencil.
2. Contact each agency and ask if they provide medical care for diabetes, including diagnosis and management. If YES, ask for the name and phone number of a person (dietitian, nurse, etc.), who can answer questions regarding diabetes care and education provided by that agency. Record the **position title only (**e.g. dietitian, nurse, support staff, etc.) of the agency representative and make a correction in the phone number, if needed, for reaching that representative. **The name of this person is not required.**

3. Contact the designated agency representative by phone. Explain the purpose of your call and determine if they are the appropriate representative and ask if they are willing to participate in the survey. If not, keep trying until you are connected with the appropriate agency representative.

4. Once you make contact with the appropriate agency representative, explain the purpose of your call by saying the following:

I am _____ and I am an Extension Agent with _____.

In my job, I conduct nutrition education with individuals and groups in communities throughout (name geographic area). I am aware of the growing numbers of adults who have Type 2 diabetes and the importance of those individuals following the dietary and exercise instructions given by their physician, dietitian, or other health care workers. Virginia Cooperative Extension is conducting a survey to determine if we should be doing more to support medical and dietetics professionals in their efforts to help people with Type 2 diabetes learn how to control their disease. Would you be willing for me to discuss this issue further with you?

5. Once the agency has verbally agreed to participate, obtain information for each question on the *Community Diabetes Education Survey form for Hospitals, Medical Clinics and Health Agencies,* as follows:

Question 1.

Ask the agency representative whether or not diabetes testing and treatment is being conducted by this agency/institution and circle "YES" or "NO".

If the answer is "NO," explain that the remaining questions are for those who actually work with people having diabetes. Proceed to ask the person their view on which clinics or agencies in that area are working with relatively high numbers of people with diabetes. If this gives new leads, add that agency to your list.

Question 2.

If the response is YES to question 1, ASK: "On average, how many patients with diabetes does your agency serve in a year?" Record the number.

Question 3.

Ask the agency representative whether or not they offer diabetes counseling and education to individuals with diabetes who **ARE** their patients. Mark YES or NO, as appropriate.

Question 4.

Ask the agency representative whether or not they offer diabetes counseling and education to individuals with diabetes who are **NOT** their own patients. Mark YES or NO, as appropriate.

Question 5

Ask the agency representative whether or not they offer group classes on diabetes education?

Mark YES or NO, as appropriate.

Question 6.

SAY*: **Now, I would like to get an idea of the topics you cover in your education, whether***

with your own patients or with others in the community. As I name some specific topics, would you please tell me if these topics are covered well or fairly well in your education efforts.

(Mark all the topics covered in education by this agency and ask if they cover any topics that are not listed and write those down as well)

A. How to use insulin or other medications

B. Diet or eating pattern

C. Physical activity or exercise

D. Foot care

E. What to do if blood sugar is extremely low or high

Question 7.

(If group classes are provided) ASK if their agency charges a fee for attending these classes. Mark YES or NO, as appropriate and record the fee in the spaces provided, as cost per class OR cost per series of classes.

Question 8.

ASK: Does your agency conduct any type of educational efforts in the community to aid in the **prevention** of diabetes? Some examples of this type of effort would be public service announcements on radio or television, newspaper articles, or education for groups in the community. Mark YES or NO, as appropriate.

Question 9.

If YES, to question 8, Ask: What efforts are being made by your Hospital, Agency, or Medical Clinic to conduct education for the prevention of diabetes? (Mark all the efforts being made by the agency, also ask if there is anything else that they are doing that was not listed and write those down as well)

Question 10.

SAY: Now, I would like to get an idea of your agency's efforts at including low-income people in diabetes education. I am aware that this group of people might be the most difficult to reach with diabetes education.

ASK: Does your agency make special efforts to reach low-income people with diabetes education? Mark YES or NO, as appropriate.

Question 11.

(This question applies only if the agency representative indicates they offer group education classes in the community).

ASK: What portion of your class participants is low-income? (Circle the appropriate amount)

End the interview by thanking the agency representative for his/her cooperation in answering your questions.

SAY: We will be summarizing the results of our survey after we interview other agencies.

ASK: Would you or others in your agency be interested in collaborating with Extension to provide additional education for those with diabetes, or their family members?

(The Extension agent should record a note, regarding the response, for their future use).

REPEAT above steps and questions with all agencies on the list.

By **3/29/02**, return completed copies of Part I forms to:

Ruby H. Cox
101 Wallace Annex (0228)
Blacksburg, VA 24061

Part II: Community Diabetes Education Survey for Individual Health Agencies (Hospitals, Medical Clinics, and Other Health Agencies)

Name of Hospital, Agency, or Clinic:

_____

Position Title of Person Completing this Form:

_____

Phone Number: _____ **Date:**

_____

****

1. Does your Hospital, Agency, or Medical Clinic provide diagnosis and treatment of diabetes for adults? **(Please Circle Your Answer)**

a. YES **b. NO**

2. Approximately how many adult diabetes patients does your Hospital, Agency, or Medical Clinic serve yearly?

Number: _____ Per Year

3. Does your Hospital, Agency, or Medical Clinic provide diabetes counseling and education for your **own** patients? **(Please Circle Your Answer)**

a. YES **b. NO**

4. Does your Hospital, Agency, or Medical Clinic provide diabetes counseling and education for people within the community, who have diabetes, but who are NOT your patients?

(Please Circle Your Answer)

a. YES **b. NO**

5. Do you provide **group classes** on diabetes education? **(Please circle your answer).**

a. YES **b. NO** **If NO, skip to Question 8**.

6. If YES to Question 5, what topics are covered in your **group** diabetes education classes?

(Please Circle All That Apply)

a. Use of insulin or other medications
b. Diet or eating pattern
c. Physical activity or exercise
d. Foot Care
e. What to do if blood sugar is extremely low or high
f. Other **(Please specify):**

_____

7. If your agency or clinic provides group diabetes education, is there a fee for participation in these classes? **(Please Circle Your Answer)**

a. YES **b. NO** **IF YES, cost per class**
$_____

OR
cost per series of classes
$_____

8. Does your Hospital, Agency, or Medical Clinic conduct education for the **prevention** of diabetes? **(Please Circle Your Answer)**

a. YES **b. NO**

9. If YES to question 8, what efforts are being made by your Hospital, Agency, or Medical Clinic to conduct education for the **prevention** of diabetes? **(Check All That Apply)**

a. Classes for at risk individuals
b. Health Fairs
c. Newspaper articles
d. Newsletters
e. Messages/programs on TV
f. Messages/programs on Radio
g. Other (specify): _____

10. Are efforts made by your Hospital, Agency, or Medical Clinic to include low-income people in diabetes education? **(Please Circle Your Answer)**

a. YES **b. NO**

11. About how many of class participants are identified as (or appear to be) low-income?
(Please circle answer)

a. ¼ or less **b.** ¼ to ½ **c.** ½ to ¾ **d.** ¾ or more **e.** Don't know

12. Would you be interested in collaborating with Virginia Cooperative Extension, Nutrition and Wellness Agents to offer group classes for individuals having type 2 diabetes (on topics such as food preparation, grocery shopping, and physical activity for management of diabetes)?

____ **YES** _____ **NO** _____ Would like further information before deciding

Thank you for completing this questionnaire. If you would like a copy of the Executive Report, when the study has been completed, please put you name and address below:

_____
_____
_____
_____

By March 28, 2002, please return completed questionnaire to (agent's name and local address):

Education Recognition Program

The following diabetes education programs in your area are Recognized by the American Diabetes Association. These Recognized programs meet the National Standards for excellence in diabetes education.

Facility: Johnston Memorial Hospital
Program Name: Diabetes Education Center
Address: 351 Court Street NE
City, State, Zip: Abingdon, VA, 24210
Phone: 540-676-6600

Facility: Inova Health System/Inova Alexandria Hospital
Program Name: Inova Diabetes Center Education Program
Address: 4320 Seminary Road
City, State, Zip: Alexandria, VA, 22304
Phone: 703-504-3678

Facility: Inova Health System/Inova Mount Vernon Hospital
Program Name: Inova Diabetes Center Education Program
Address: 2501 Parker's Lane
City, State, Zip: Alexandria, VA, 22306
Phone: 703-664-7063

Facility: Giant Food, Inc.
Program Name: Giant Diabetes Care Outpatient Education Program
Address: Giant Pharmacy, Store #1049
7137 Columbia Pike
City, State, Zip: Annandale, VA, 22003
Phone: 703-256-2773

Facility:	Virginia Hospital Center-Arlington
Program Name:	Diabetes Education Program
Address:	1701 N. George Mason Drive
City, State, Zip:	Arlington, VA, 22205
Phone:	703-558-6269

Facility:	Carilion Health System
Program Name:	Carilion Diabetes Management Program-CBMH
Address:	1613 Oakwood Street
City, State, Zip:	Bedford, VA, 24523
Phone:	540-586-2441

Facility:	Wellmont Lonesome Pine Hospital
Program Name:	Diabetes Treatment Center
Address:	1990 Holton Avenue
City, State, Zip:	Big Stone Gap, VA, 24219
Phone:	423-224-3575

Facility:	Main Campus of the University of Virginia Health System
Program Name:	Diabetes Community Network - Outpatient Self-Management Education Program
Address:	Lee Street
City, State, Zip:	Charlottesville, VA, 22908
Phone:	434-924-0372

Facility:	Martha Jefferson Hospital
Program Name:	Martha Jefferson Diabetes Education Program
Address:	459 Locust Avenue
City, State, Zip:	Charlottesville, VA, 22902
Phone:	804-244-4447

Facility:	Northridge of the University of Virginia Health System
Program Name:	Diabetes Community Network - Outpatient Self-Management Education Program
Address:	2955 Ivy Road, Box 801311
City, State, Zip:	Charlottesville, VA, 22903-1311
Phone:	434-243-4614

Facility:	Chesapeake General Hospital
Program Name:	Lifestyle Center
Address:	800 N. Battlefield Boulevard
City, State, Zip:	Chesapeake, VA, 23320
Phone:	757-312-6132

Facility:	Chesapeake General Hospital
Program Name:	Comfort Care
Address:	667 Kingsborough Square, Suite 201
City, State, Zip:	Chesapeake, VA, 23320
Phone:	757-312-6460

Facility:	Chesapeake General Hospital
Program Name:	The Diabetes Education Program
Address:	736 N. Battlefield Boulevard
City, State, Zip:	Chesapeake, VA, 23320
Phone:	757-312-6132

Facility:	Danville Regional Medical Center
Program Name:	Outpatient Diabetes Education Program
Address:	The Better Health Center 413 Mount Cross Road, Suite 104

City, State, Zip:	Danville, VA, 24540
Phone:	804-773-6806

Facility:	Inova Health System/Inova Fair Oaks Hospital
Program Name:	Inova Diabetes Center Education Program
Address:	3700 Joseph Siewick Drive, Suite 408A
City, State, Zip:	Fairfax, VA, 22033
Phone:	703-391-3746

Facility:	Inova Health System/Inova Fairfax Hospital
Program Name:	Inova Diabetes Center Outpatient Education Program
Address:	2832 Juniper Street
City, State, Zip:	Fairfax, VA, 22031
Phone:	703-204-3300

Facility:	Augusta Medical Center
Program Name:	Diabetes Self-Management Education Program
Address:	78 Medical Center Drive
City, State, Zip:	Fishersville, VA, 22939
Phone:	540-332-4708

Facility:	Mary Washington Hospital
Program Name:	Diabetes Self-Management Program
Address:	1001 Sam Perry Blvd.
City, State, Zip:	Fredericksburg, VA, 22401
Phone:	540-899-1460

Facility:	Valley Health System
Program Name:	Warren Memorial Hospital, Diabetes Management Program

Address:	100 North Shenandoah Avenue
City, State, Zip:	Front Royal, VA, 22630
Phone:	540-636-0245

Facility:	Ukrop's Supermarkets
Program Name:	Virginia Center Marketplace
Address:	10150 Brook Road
City, State, Zip:	Glen Allen, VA, 23060
Phone:	804-261-1760

Facility:	Sentara Careplex
Program Name:	Sentara Hampton General
Address:	3120 Victoria Boulevard
City, State, Zip:	Hampton, VA, 23669
Phone:	757-727-7301

Facility:	Veterans Affairs Medical Center
Program Name:	Diabetes Education Program
Address:	100 Emancipation Drive
City, State, Zip:	Hampton, VA, 23667
Phone:	757-722-9961 X 2675

Facility:	Loudoun Hospital Center
Program Name:	Loudoun Hospital Center Outpatient Diabetes Management Program
Address:	44045 Riverside Parkway
City, State, Zip:	Leesburg, VA, 20176
Phone:	703-858-6358

Facility:	Alleghany Regional Hospital

Program Name: Outpatient Education Center
Address: 1 Arh Lane
City, State, Zip: Low Moor, VA, 24457
Phone: 540-862-6555

Facility: Registered Nutrition Counselors
Program Name: Diabetes Outpatient Self-Management Program
Address: 5678 Davis Ford Road
City, State, Zip: Manassas, VA, 20112
Phone: 703-690-3465

Facility: Prince William Health System
Program Name: Prince William Diabetes Services
Address: 8640 Sudley Road, Suite 113
City, State, Zip: Manassas, VA, 20110
Phone: 703-369-8405

Facility: Memorial Hospital
Program Name: The Diabetes Education Program
Address: 320 Hospital Drive
City, State, Zip: Martinsville, VA, 24112
Phone: 540-666-7815

Facility: Cumberland a Brown's School Hospital for Children and Adolescents
Program Name: Diabetes Education Program
Address: 9407 Cumberland Road
PO Box 150
City, State, Zip: New Kent, VA, 23124
Phone: 804-966-2242

Facility:	Riverside Health System/Riverside Regional Medical Center
Program Name:	Riverside Diabetes and Education Services
Address:	500 J. Clyde Morris Boulevard
City, State, Zip:	Newport News, VA, 23601
Phone:	757-594-2935

Facility:	Sentara Healthcare
Program Name:	Sentara Leigh Hospital
Address:	830 Kempsville Road
City, State, Zip:	Norfolk, VA, 23502
Phone:	757-668-3432

Facility:	Sentara Healthcare
Program Name:	Sentara Norfolk General Hospital
Address:	600 Gresham Drive
City, State, Zip:	Norfolk, VA, 23507
Phone:	757-668-3432

Facility:	Eastern Virginia Medical School
Program Name:	The Leonard R. Strelitz Diabetes Institutes
Address:	855 W. Brambleton Avenue
City, State, Zip:	Norfolk, VA, 23510-1001
Phone:	757-446-5909

Facility:	Orange Medical Center of the University of Virginia Health System
Program Name:	Diabetes Community Network - Outpatient Self-Management Education Program
Address:	661 University Lane, Suite B
City, State, Zip:	Orange, VA, 22960

Phone: 540-672-5500

Facility: Carilion Health System
Program Name: Carilion Diabetes Management Program-CNRVMC
Address: 2900 Tyler Road
City, State, Zip: Radford, VA, 24141
Phone: 540-731-2506

Facility: Reston Hospital Center
Program Name: Diabetes Education Program
Address: 1850 Town Center Parkway
City, State, Zip: Reston, VA, 20190
Phone: 703-689-9100

Facility: Ukrop's Supermarkets
Program Name: Laburnum
Address: 4346 S. Laburnum Avenue
City, State, Zip: Richmond, VA, 23231
Phone: 804-226-4933

Facility: Ukrop's Supermarkets
Program Name: Short Pump
Address: 3460 Pump Road
City, State, Zip: Richmond, VA, 23233
Phone: 804-364-1487

Facility: Ukrop's Supermarkets
Program Name: Chesterfield Town Center
Address: 11361 Midlothian Turnpike
City, State, Zip: Richmond, VA, 23235

Phone:	804-379-9536

Facility:	Richmond Apothecaries
Program Name:	Bremo-Westhampton Pharmacy
Address:	2024 Staples Mill Road
City, State, Zip:	Richmond, VA, 23230
Phone:	804-288-8361

Facility:	CJW Medical Center
Program Name:	The Diabetes Care Center Outpatient Self-Management Education Program
Address:	7101 Janke Road
City, State, Zip:	Richmond, VA, 23225
Phone:	804-323-8055

Facility:	Hunter Holmes McGuire VA Medical Center
Program Name:	Diabetes Education Program
Address:	1201 Broad Rock Boulevard
City, State, Zip:	Richmond, VA, 23249
Phone:	804-675-5629

Facility:	HEALTHSOUTH Rehabilitation Hospital of Virginia
Program Name:	Diabetes Lifeskills Outpatient Education Program
Address:	5700 Fitzhugh Avenue
City, State, Zip:	Richmond, VA, 23226
Phone:	804-673-4514

Facility:	HCA Retreat Hospital
Program Name:	Diabetes Lifestyle Center Outpatient Self-Management Program

Address: 2621 Grove Avenue
City, State, Zip: Richmond, VA, 23220
Phone: 804-254-5382

Facility: Bon Secours St. Mary's Hospital
Program Name: The Outpatient Diabetes Education Program of the Diabetes Treatment Center
Address: 5801 Bremo Road, Room 158 Education Wing
City, State, Zip: Richmond, VA, 23226
Phone: 804-287-7239

Facility: The Endocrine and Diabetes Management Center
Program Name: Diabetes Education Program
Address: 7231 Forest Avenue, Suite 103
City, State, Zip: Richmond, VA, 23226
Phone: 804-288-0202 X 14

Facility: Carilion Health System
Program Name: Carilon Diabetes Management Program-CMC
Address: 1030 South Jefferson Street, Suite G101
City, State, Zip: Roanoke, VA, 24016
Phone: 540-224-4360

Facility: Carilion Health System
Program Name: Carilion Diabetes Management Program-CFMH
Address: 180 Floyd Avenue
City, State, Zip: Rocky Mount, VA, 24151
Phone: 540-489-6506

Facility: Department of Veterans Affairs Medical Center

Program Name:	Diabetes Outpatient Education Program
Address:	VA Salem 120D
	1970 Roanoke Blvd.
City, State, Zip:	Salem, VA, 24153
Phone:	540-982-2463 X 2561

Facility:	National Diabetic Pharmacies
Program Name:	National Diabetic Pharmacies Diabetes Self-Management Program
Address:	2157 Apperson Drive
City, State, Zip:	Salem, VA, 24153
Phone:	540-777-0000 X 1426

Facility:	Lewis-Gale Medical Center
Program Name:	Diabetes Care Center Self-Management Program
Address:	1900 Electric Road
City, State, Zip:	Salem, VA, 24153
Phone:	540-776-4567

Facility:	Halifax Regional Hospital
Program Name:	Diabetes Outpatient Education Program
Address:	2204 Wilborn Avenue
City, State, Zip:	South Boston, VA, 24592
Phone:	804-517-3212

Facility:	Inova Health System/Inova VNA Home Health
Program Name:	Inova Diabetes Center Education Program
Address:	8003 Forbes Place
City, State, Zip:	Springfield, VA, 22151
Phone:	703-321-6000

Facility: Sentara Healthcare
Program Name: Sentara Virginia Beach Hospital
Address: 1060 First Colonial Road
City, State, Zip: Virginia Beach, VA, 23454
Phone: 757-395-8825

Facility: Sentara Healthcare
Program Name: Sentara Healthcare Diabetes Program
Address: 4417 Corporation Lane
City, State, Zip: Virginia Beach, VA, 23462
Phone: 757-552-7198

Facility: Sentara Healthcare
Program Name: Sentara Bayside Hospital
Address: 800 Independence Boulevard
City, State, Zip: Virginia Beach, VA, 23455
Phone: 757-668-3432

Facility: Sentara Healthcare
Program Name: Williamsburg Community Hospital
Address: 5301 Longhill Road, Second Floor
City, State, Zip: Williamsburg, VA, 23188
Phone: 757-259-4225

Facility: Valley Health System
Program Name: Winchester, Diabetes Management Program
Address: 333 West Cork Street
City, State, Zip: Winchester, VA, 22601
Phone: 540-536-5108

Facility:	Potomac Hospital
Program Name:	Diabetes Management Program
Address:	2300 Opitz Boulevard
City, State, Zip:	Woodbridge, VA, 22191
Phone:	703-670-1767

Appendix B

February 22, 2002

MEMORANDUM

TO: EFNEP and SCNEP Program Assistants who have clients with Type 2 Diabetes
FROM: Ruby H. Cox, State EFNEP/SCNEP Coordinator

RE: Your participation in the Diabetes Study with EFNEP and SCNEP Clients

Your participation in the Type 2 Diabetes Study is greatly appreciated. Please carefully read this memo. Your Area Coordinator will be sending you a supply of the client questionnaire, consent form, and Response Cue Cards and will give further instructions. You should have clients to sign two copies of the consent form. Return one copy of the consent form with the completed questionnaire and leave the other copy with the client

You are asked to interview up to six (6) currently enrolled EFNEP or SCNEP clients (16 years and older) who have Type 2 Diabetes. To insure that they have "Type 2 diabetes" please interview only those whose diabetes was diagnosed at age 16 or older. If you have 6 or fewer clients that have diabetes, please interview all of them. If you have more than 6 clients with type 2 diabetes, you can choose only 6 to interview. Make your selections in a way that will provide a good representation of all your clients having diabetes. For example, try to obtain a balance between those that may be managing their diabetes well with those who are not. **Prior to interviewing clients, be sure to read the green "Instructions for EFNEP and SCNEP Program Assistants" that will be provided with your supply of questionnaires and consent forms.**

You can do your interviews in one of two ways:
1. The preferable way is to conduct face-to-face interviews with one individual at a time.
2. If you work with homemakers in groups and must interview those with diabetes in a group setting, please try to do this with only 2 or 3 at a time.

RECORDING RESPONSE: When interviewing only one client, you should record the client's answers yourself. For some questions (as noted on the questionnaire), you should give the client a cue card showing the possible answers (ivory colored visuals on cardstock paper).

When interviewing clients in small groups, have clients record their own responses, but you should orally lead the group through the questionnaire together (i.e. question by question). Please caution them to not talk about their opinions or answers. It is important to avoid letting them influence each other's answers. Each PA will be provided with two sets of the ivory colored cue cards showing possible answers to certain questions, as indicated on the questionnaire.

For Question 18:

- If the client says **YES, indicating that they exercise regularly**, have them continue to answer Questions 19 through 24. However, do not have them answer Question 25, as **this question is only for those who <u>do not</u> exercise regularly.**
- If the clients says **NO,** meaning they **DO NOT exercise regularly,** they should skip to Question 25 and NOT answer Questions 19 – 24.

Instructions for SCNEP Program Assistants
to follow in completing the
Attitudes, Knowledge, and Behavior Questionnaire

These instructions are intended to help you complete the questionnaire titled *Attitudes, Knowledge, and Behavior Questionnaire.* You are asked to complete this questionnaire with all your SCNEP clients who have Type 2 Diabetes and who are enrolled in one of these programs during the months of March and April 2002. "Client" refers to the homemaker or other adult family members living in the home.

Our goal is determine the status of various issues related to successful management of diabetes, including how clients feel about their disease and what they are doing to manage their diseases. This will help us develop better strategies and materials for helping future clients to manage their diabetes.

We are asking you to do a one-on-one interview with individual homemakers or other adults who have Type 2 Diabetes. The interviews can be conducted in the home or in a private location, in a situation where client has attended a group function.

Prior to the Interview: Prior to conducting the first interview, you should become familiar with the questions on the questionnaire and conduct a "practice interview" with a co-worker.

During the Interview: Before asking a question, tell the client the format of possible responses and show them the appropriate visual containing the possible responses. For example say something like this:

"*For the next question*, *this visual shows the possible responses, which include* (show appropriate visual and go over possible responses for that question). *When I read the question to you, please tell me which one of these responses best matches your opinion."*

Please read the questions as they appear on the form. If the client does not seem to understand, you can elaborate, but be careful to not influence the client's response.

There are four sections in the questionnaire that assess different aspects of how a person views or reacts to his or her diabetes.

A. Questions 1 – 6 assess the homemaker's perception of his or her health status.

B. Questions 7 – 10, assess what **education** might been provided to the client on diabetes, their understanding of diabetes, and whether or not they feel they are **knowledgeable** on how to manage their disease. Make sure the client understands that you're asking about their **knowledge** on the topics listed and not how they are dealing with them.

C. Questions 11 deals with the client's **attitude and feelings** toward their disease.

D. Questions 12 – 25 deal with **behaviors** that the client may or may not have adopted for managing their diabetes.

Any words that have been **bolded** or <u>underlined</u> on the questionnaire, please place an emphasis on, so that the client will understand what you are asking

When you are finished with all the questions, thank the client for his/her cooperation and helpfulness. When you have interviewed all your clients who have diabetes at the time of the study, please make a copy of client's Family Record, attach this completed questionnaire to it and **mail to: Ruby H. Cox, 101 Wallace Annex (0228), Blacksburg, VA.**

Client Informed Consent
for Research Involving Human Subjects

Title of Project: Type 2 Diabetes in EFNEP and FSNEP clients in Virginia

Those Conducting the Study:

John Paul Carpenter, Virginia Tech Graduate Student Phone: 540-231-2488
Dr. Ruby H. Cox, State EFNEP/SCNEP and Faculty Member Phone: 540-231-7156

Dear_____
(Name of Participant)

You are invited to take part in a study to assess behaviors, knowledge, and feelings towards type 2 diabetes. If you are interested in participating after reading this entire document, you will be asked to sign and date the designated place at the end of the document. The purpose of this informed consent is **to protect you and your rights. It does not obligate you to continue to participate, or to do anything that you do not wish to do.**

X. Purpose of Research

The purpose of the study is to assess the extent to which diabetes education is:

- Available and easily accessible to the low-income adults living in Virginia
- Assess EFNEP and FSNEP clients regarding knowledge, attitudes, and behaviors, that may affect their management of diabetes

Results will be used to help develop diabetes education programs for use in the Virginia Cooperative Extension (VCE), especially in the Expanded Food and Nutrition Education (EFNEP) and the Smart Choices Nutrition Education Program (SCNEP).

XI. Study Procedures

1. This study will include at least 75 to 125 men and women, who are 16 years of age, who have type 2 diabetes, and who are clients of EFNEP/SCNEP.

2. You have been asked to participate due to one of the following:
   c. You are a current participant in either EFNEP or SCNEP.
   d. You are over the age of 16.
   e. You have type 2 diabetes.

3. As a participant in this study, you will be asked to complete the following study activities:

   - Allow an EFNEP or SCNEP Program Assistant (PA) to interview you to complete a questionnaire.

   - Answer questions asked by the PA about yourself and your diabetes. The PA will fill out the questionnaire regarding your attitudes, behaviors, and knowledge about your diabetes.

4. Dr. Ruby Cox or John Paul Carpenter will be available to answer questions. You can also call this Toll Free number **1-888-814-7627** between the hours of 9:00 AM – 5:00 PM Monday – Friday. If you call and get a recording, please leave your name, phone number, and a time that you can be reached. Someone will return your call.

XII. Risks

- There are no perceivable risks associated with participating in this study.

XIII. Benefits of the Study

Advantages to you will include:

- Estimation of body mass index from weight and height
- Physical activity patterns
- Measurement of knowledge of type 2 diabetes

There is no promise of benefits being made to encourage your participation in this study.

XIV. Confidentiality

- Only you, the investigators, and the EFNEP/SCNEP Program Assistant (PA) will be allowed to see your personal information.
- At no one time will the researchers release individual information to anyone other than the above stated individuals, without your written consent.
- Overall results, without use of participant names, will be combined in a report for others to see. Your identity will not be revealed.

XV. Compensation

There will be no payment for participating in this study.

XVI. Freedom to Withdraw

You are free to withdraw from this study at any time without penalty. If at anytime you feel uncomfortable with a question, you do not have to answer that question.

XVII. Approval of Research

This research project has been approved, as required, by the Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic Institute and State University and the Department of Human Nutrition, Foods and Exercise.

XVIII. Subject's Responsibilities

I voluntarily agree to participate in this study. I have the following responsibilities:

- I will answer the questions as accurately and honestly as possible.
- If I do not understand a question or directions, I will ask the Investigator or Program Assistant or call the phone numbers provided for help.

XIX. Subject's Permission

I have read and understand the Informed Consent and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent for participation in this project.

If I participate, I may withdraw at anytime without penalty. I agree to abide by the rules of this project.

_____ _____

Signature of Client Date

_____ _____

Signature of Program Assistant Date

Should I have any questions about this research or its conduct, I may contact:

John Paul Carpenter (540) 231-2488
Investigator, Virginia Tech Phone

Ruby H. Cox, PhD (540) 231-7156
Associate Professor-HNFE Phone
102 Wallace Annex
Blacksburg, VA 24061-0228

David M. Moore (540) 231-4991
Chair, IRB Phone

Office of Research Compliance
Research & Graduate Studies

Attitudes, Knowledge, and Behavior Questionnaire for Diabetes Patients

Client ID #: _____ Date Completed:_____

Program Assistant Completing Form: _____ Extension Unit: _____

****

Introduction (Interviewer should say to client): I have a number of questions I am going to ask you that are related to your diabetes. These questions are related to what you may have been told to do in caring for yourself, or what you know about diabetes, or what you are actually doing to control your blood sugar. Please answer as truthfully as you can. No one knows everything there is to know about diabetes and no one always does everything right. So please don't be concerned or embarrassed that you will give the wrong answers. In fact, for most questions, there are no right or wrong answers. We just want to know what you know or what you are doing at this time.

Assessment of Perceived Health Status:

1. Please answer the following questions about your diabetes **(Record a number or check the appropriate response)**.

(a) How long have you known you have diabetes? ____ Years OR ___ Month OR ___ Weeks

(b) Are you taking insulin (shots) to control your diabetes? ___ Yes ___ No

(c) Are you taking medicine (pills) to control your diabetes? ___ Yes ___ No

2. Overall, how would you **rate your health**? (Check one response)

__ *Excellent* __ *Good* __ *Fair* __ *Poor*

Note to Interviewer: Before asking questions 3, 6, 8, 9, 10, 12, and 25, show client the appropriate visual that shows all possible responses for that question.

3. Compared to one year ago, how would you now rate your overall health? (**Show client a card listing all possible responses**) (Check one response)

a) ___Much better

b) ___Somewhat better

c) ___About the same

d) ___Somewhat worse

e) ___Much worse

4. Do you have any of the following: (Check (✓) all that the client has)

___ Health Insurance ____ Medicare ____ Medicaid ____ Do not have any of these

5. If you have one of the above types of health insurance, does your insurance cover education to manage your diabetes? (Check one response)

___ Yes ___ No ____ Not sure/Don't know

6. For this question, I am asking how often you **actually do** four things that are related to controlling your diabetes.

NOTE to Interviewer: Show client a card listing all possible responses. Emphasize that you want to know if the client actually does each and are not asking if they just know about it.

Check (✓) the column under the response that most closely matches respondent's answer.	**Never 1**	**Sometimes 2**	**Most of the time 3**	**Always 4**
a) Do you keep your blood sugar in good control?				
b) Do you keep your weight under control?				
c) Do you feel dissatisfied with your life because of your diabetes?				
d) Do you successfully handle your feelings (e.g. fear, worry, anger)?				

Education Provided by Health Care Provider(s)

7. Have you ever **received diabetes education** (such as attending group classes or having a meeting with a nurse, dietitian, or other health care provider)? (Check one response)

___ Yes ___ No ___ Cannot remember/Not sure

Knowledge

8. The following questions are about how **knowledgeable** you are on topics related to **diabetes.**

NOTE to Interviewer: Show client a card with all possible responses.

SAY: For this question I am asking if you think you **know** much about each topic. At this point, I am not asking whether you actually do it, but only whether you are knowledgeable about it.

Place a check (✓) in the column that indicates the client's	**Excellent**	**Good**	**Fair**	**Poor**

response.	**4**	**3**	**2**	**1**
a) Overall diabetes care				
b) Coping with stress				
c) Diet for blood sugar control				
d) The role of physical exercise in diabetes care				
e) Medications you are taking				
f) How to use the results of blood glucose monitoring				
g) How diet, exercise, and medicines affect blood sugar levels				
h) Prevention and treatment of low blood sugar				
i) Prevention of long-term complications of diabetes				
j) Foot care				
k) Benefits of improving blood sugar control				

Feelings Toward Diabetes

9. For this question, I am going to read 9 statements of **feelings or emotions** about several issues related to your diabetes. Please tell me the extent of your agreement or disagreement with each statement. (Show client a card with all possible responses).

Place a check ☑ in the appropriate place to match the client's response.	**Strongly Agree 1**	**Agree 2**	**Disagree 3**	**Strongly Disagree 4**
a) I am afraid of my diabetes.				
b) I find it hard to believe that I really have diabetes.				
c) I feel unhappy and depressed because of my diabetes.				
d) I feel satisfied with my life.				
e) I feel I'm not as good as others because of my diabetes.				
f) I can do just about anything I set out to do.				
g) I find it hard to do things to care for my diabetes.				
h) Diabetes doesn't affect my life at all.				
i) Things are going very well for me right now.				

Behaviors Associated With Diabetes

10. In this question, I am asking about whether or not your diabetes or its effects on your health, limits you in doing several types of daily activities?

NOTE to Interviewer: Show client a card with all possible responses

Place a check (✓) in column that reflects client's response.	**Limited A Lot 1**	**Limited Somewhat 2**	**Not Limited 3**
To what extent does your diabetes or health limit you in doing: **a. Vigorous activities** (e.g., running, lifting heavy objects, participating in strenuous sports)			
b. Moderate activities, (e.g., such as moving a table, pushing a vacuum cleaner, bowling, or playing golf)			
To what extent does your diabetes or health limit you in: c) Lifting or carrying groceries?			
d) Climbing one flight of stairs?			
e) Bending, kneeling, or stooping?			

f) Walking at least a mile?			
g) Bathing or dressing yourself?			

Dietary Recommendations:

11. Has a doctor, nurse, or other health care provider **told you to follow a meal plan or certain way of eating**? (Check one response)

___ Yes ___ No, (Skip to Question 16) ____ Can't remember/Not sure **(Skip to Question 16)**

12. (If client answered **YES** to the above question): **How often do you follow the recommendations**?
(**Show client a card with all possible responses**) (Circle Response)

Never	***Almost Never***	***Sometimes***	***Almost* Always**	***Always***
1	2	3	4	5

13. Have you been told to eat your meals and snacks on a certain schedule? (Check one response)

___ Yes ___ No ___ Can't remember/Not sure

14. Have you been told to weigh or measure your food? (Check one response)

___ Yes ___ No ___ Can't remember/Not sure

15. Have you been told to use exchange lists or food group lists to plan your meals? (Check one response)

___ Yes ___ No ___ Can't remember/Not sure

16. If you **never or almost never follow a certain eating plan**, why not?
(Check (✓) all that apply).

_____ a. Have never been told to follow an eating plan
_____ b. Have been told to eat a certain way, but did not understand the instructions
_____ c. Don't have money to afford the foods that were recommended
_____ d. I don't feel I need to eat this way to control my diabetes
_____ e. The recommended eating plan is too hard or complicated
_____ f. Other Explain:_____

Exercise/Physical Activity

17. Has your doctor, nurse, or other health care provider ever told you **to exercise regularly**? (Check one response)

___ Yes ___ No ___ Cannot remember/Not sure

18. Do you exercise or participate in any physical activities on a regular basis (i.e. 3 to 5 times per week of activities such as walking, jogging, cycling, swimming, dancing, gardening)?

_____Yes _____ No, (Skip to Question 25)

19. If you participate in exercise or are physically active, what activities are you currently doing?

_____

20. How often do you exercise or participate in physical activities?
(Check the response that most closely matches client's answer)

a. ____Once a week
b. ____**2-3** times per week
c. ____**3-4** times per week
d. ____**4-5** times per week
e. ____**5-6** times per week
f. ____**6-7** times per week

21. How much time do you spend exercising or participating in physical activities each day?
(Check the response that most closely matches what client's answer).

a. ____Less than **15** minutes
b. ____**15 to 30** minutes
c. ____**30** minutes
d. ____**30 to 45** minutes
e. ____**46 to 60** minutes
f. ____Greater than **60** minutes

22. Has exercise/physical activity been a part of your life all along or did you start exercising because of your type 2 diabetes? **(Check the response that most closely matches client's answer)**

a. ____**Exercise/Physical Activity** has been a part of my life before my type 2 diabetes
b. ____I started **Exercise/Physical Activity** because of my type 2 diabetes
c. ____I do not engage in **Exercise/Physical Activity** because of my type 2 diabetes

23. Who instructed you on beginning an exercise routine? **(Check all that apply)**

a. ___No one has given instructions
b. ___Physician
c. ___Nurse
d. ___Dietitian
e. ___Caregiver
f. Other

_____

24. Do you feel better when you exercise? **Check (✓) response that matches client's answer.**

____ Yes, always ___ Yes, most of the time ___ No, not usually ___ No, never

Barriers to Regular Exercise

25. For this question, I will read 7 statements about possible barriers that may be standing in the way of your exercising regularly. These statements may or may not describe your situation. When I read each statement, please tell me the extent to which you agree or disagree with the statement.

(Show client a card that list possible responses)

To what extent do you agree with these statements?	**Strongly Agree 1**	**Agree 2**	**Disagree 4**	**Strongly Disagree 5**
a) Exercise takes too much effort.				
b) Exercise takes too much time.				
c) Exercise is not enjoyable.				
d) My health problems prevent me from exercising.				
e) Exercise makes my diabetes more difficult to control.				
f) I don't have a safe and convenient place to exercise.				
g) I don't believe exercise is helpful for me.				

NOTE to Interviewer: Express thanks to the client for providing responses to questions. Assure client that his/her individual responses will be kept confidential.

After completing this form, make a copy of "first" page of the client's Family Record and staple this form to that copy.

On or before March 28, 2002, please mail all completed copies of this form, along with signed consent forms for each client, to:

Ruby H. Cox
101 Wallace Annex (0228)
Blacksburg, VA 24061

Answer card #1 for Question 3

A= Much Better

B= Somewhat Better

C= About the Same

D= Somewhat Worse

E= Much Worse

Answer Card # 2 for Question 6

Never

Sometimes

Most of the Time

Always

Answer card #3 for Question 8

Excellent

Good

Fair

Poor

Answer card #4 for Questions 9 and 25

Strongly Agree

Agree

Disagree

Strongly Disagree

Answer card #5 for Question 10

Limited A Lot

Limited Somewhat

Not Limited

Answer Card #6 for Question 12

1=Never

2=Almost Never

3=Sometimes

4=Almost Always

5=Always

Answer Card #7 for Question 20

a. Once a week

b. 2-3 times per week

c. 3-4 times per week

d. 4-5 times per week

e. 5-6 times per week

f. 6-7 times per week

Answer card #8 for Question 21

a. Less than 15 minutes

b. 15 to 30 minutes

c. 30 minutes

d. 30 to 45 minutes

e. 46 to 60 minutes

f. Greater than 60 minutes

Virginia Cooperative Extension
EFNEP and SCNEP Programs

EFNEP AND SCNEP FAMILY RECORD

(Use with Older Homemakers/Individuals)

REVISED 2001 **PUBLICATION 360-095**

Complete on each family at ENTRY into EFNEP/SCNEP and again at EXIT. Program Assistant should fill in shaded items.

1. PA's Name & ID#:

2. Check: ENTRY_____ EXIT_____

3.Unit ID: _____

4.Homemaker's ID: __ _____

5. Enrolled in EFNEP before? (circle Yes OR No) Yes No

6. If Yes, did you receive a Certificate of Completion? Yes No

7. Age: _____

8. Sex:
Female _____
Male _____

Homemaker (First) (MI) (Last)
a) Name _____
b) Street _____
c) City _____ Zip _____
d) Phone _____

*10. Chronic Diseases/Conditions *(Check those that apply)*
___ Diabetes (sugar)
___ Heart Disease
___ High Cholestrol/ Triglycerides
___ High Blood Pressure
___ Osteoporosis
___ Overweight
___ Other _____

11. Race: Check the category you identify with
1-00 __White (non-Hispanic)
2-00 __Black (non-Hispanic)
3-00 __Am Indian/Alaskan Native
4-00 __Hispanic
5-00 __Asian or Pacific Islander

12. Place of Residence: circle number
1 Farm
2 Towns under 10,000 & rural non-farm
3 Towns & Cities 10,000 to 50,000
4 Suburbs of Cities over 50,000
5 Central Cities over 50,000

13. Total Household Income
Last Month: $_____
Homemaker works outside home Yes No

14. Household Members: Children by Age List First Name of Children (through Age 19)	Age (Years)
1.	
2.	
3.	
4.	
5.	
6.	
7.	

15. Number of Other Adults in Household ____
(do not count Homemaker)

16. Lesson type (Check one):
1 _____Group
2 _____ Individual
3 _____ Both
4 _____ Other
Total number of lessons recieved (AT EXIT): _____

17. SUBGROUP CODES: (see page 3)

18. Entry Date:

19. Programs/agencies from which Family received assistance at ENTRY:
(Circle YES or NO)

WIC/CSFP	Yes	No
Food Stamps	Yes	No
Commodities (TEFAP)	Yes	No
Head Start	Yes	No
Child Nutrition	Yes	No
AFDC/TANF	Yes	No
Other (Food Stamp Eligible/but not receiving)	Yes	No

Any other benefits:_____
_____

Complete this section only when homemaker graduates or drops from program

20. Exit Date:

21. Exit Reason: (circle)
1 Educational Objective Met
2 Returned to School
3 Took Job
4 Family Concerns
5 Staff Vacancy
6 Moved
7 Lost Interest
8 Other

22. Did your family get help from one or more of programs below, due to referral or suggestion by EFNEP/SCNEP Program Assistant?
Yes___ No___
If YES, check all that apply:
___ WIC
___ Food Stamps
___ Commodities (TEFAP)
___ Head Start
___ Child Nutrition
___ AFDC/TANF
___ Other _____

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

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VIRGINIA STATE UNIVERSITY

VITA

John Paul Carpenter was born on October 24, 1976 in Minneapolis/St. Paul, Minnesota. He received a Bachelor of Science in Dietetics from the University of Georgia in 2000. He will receive his Master of Science degree in Human Nutrition, Foods, and Exercise from Virginia Tech in August of 2002. Mr. Carpenter will attend the University of Virginia's Health System Dietetic Internship in September 2002. Mr. Carpenter's future plans include graduating from the dietetic internship and pursuing a career in clinical dietetics with an emphasis in diabetes and sports nutrition.