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The Role and Impact of Cooperative Extension in Diabetes Self-Management Education

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THE ROLE AND IMPACT OF COOPERATIVE EXTENSION IN DIABETES SELF-MANAGEMENT EDUCATION

THESIS

A thesis submitted in partial fulfillment of the
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ABSTRACT OF THESIS

THE ROLE AND IMPACT OF COOPERATIVE EXTENSION IN DIABETES SELF-MANAGEMENT EDUCATION

Diabetes is increasing globally and nationally. Diabetes complications and costs can be reduced through modification of lifestyle risks and diabetes self-management education (DSME). The Cooperative Extension System (CES) is uniquely positioned to implement DSME. This study assessed the role and impact of the Cooperative Extension System (CES) in DSME. A survey was sent to CES professionals throughout the U.S. a total of 43 participants provided information on 73 DSME programs. Most participants were from the South (n=22, 51.16%) and Midwest (n=12, 27.91%) and most programs targeted adults with and at risk for type 2 diabetes. Most programs were developed and taught by registered dietitians and family and consumer science agents and were focused on healthy eating and cooking techniques. Few programs addressed medications, mental and physical health, influenza and pneumococcal vaccinations. Implementation challenges were related to recruitment, attrition, and funding and most suggestions for the future of CES in DSME were related to funding. CES has a wide reach in terms of DSME with over 29 states. Future CES efforts should target children with type 2 diabetes and should form/continue partnerships with health care professionals.

KEYWORDS: Diabetes Self-Management Education, Cooperative Extension, Diabetes, National Standards of DSME, Community-based DSME, Diabetes Education

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Chapter One

Background

Diabetes is one of the most common non-communicable diseases in the world (International Diabetes Federation [IDF], 2013). Globally it is estimated that 382 million people (8.3%) suffer from diabetes. By 2035, this number has been projected to reach pandemic proportions, with the incidence almost doubling to 592 million people, equating to approximately three new cases every ten seconds. All types of diabetes are on the rise, but the number of people with type 2 diabetes is increasing in every country and is expected to increase by an astounding 55% by 2035 (IDF, 2013).

The prevalence of diabetes in the United States is also growing. According to the Centers for Disease Control and Prevention's (CDC) most recent National Diabetes Statistics Report (2014), 29.1 million (9.3%) adults had diabetes in 2012, which is up from 25.8 million (8.3%) in 2010. Of the 29.1 million people with diabetes, 8.1 million (27.8%) were undiagnosed. Furthermore, 86 million Americans age 20 and older had prediabetes in 2012, which is also up from the year 2010 prevalence of 1.9 million people. The total prevalence of diabetes in the United States is projected to increase to between 25% to 28% by 2050. The increases in prevalence have been attributed to a combination of factors, including aging of the U.S. population, increasing size of higher-risk minority populations, and declining mortality among people with diabetes (Boyle, Thompson, Gregg, Barker & Williamson, 2010).

The exact cause of type 1 diabetes is not yet known. However, several factors have been associated with an increased risk of developing type 2 diabetes such as a family history of diabetes, being overweight, having an unhealthy diet, physical

inactivity, increasing age, high blood pressure, ethnicity, impaired glucose tolerance, history of gestational diabetes and poor nutrition during pregnancy (IDF, 2013). People with diabetes also have an increased risk of developing numerous co-existing conditions and complications. Diabetes is the seventh leading cause of death in the United States. Consistently high blood glucose levels associated with diabetes lead to serious complications such as cardiovascular disease, blindness and eye problems, kidney disease, nerve damage and amputations, and are a major cause of disability and reduced quality of life (IDF, 2013). In addition, recent evidence has shown that people with diabetes are twice as likely as the average person to have depression (Egede, Zheng & Simpson, 2002).

Diabetes and its related complications are an enormous financial burden on the individual, the family and the healthcare system. According to the American Diabetes Association (ADA, 2013a), diagnosed diabetes cost the Unites States a total of $245 billion, including $176 billion in direct medical costs (institutional care, outpatient care, outpatient medication and supplies) and $69 billion in lost productivity or indirect costs (increased absenteeism, reduced productivity while at work, reduced productivity for those not in the labor force, unemployment as a result of disease-related disability and lost productive capacity due to early mortality) in 2012. In addition, earlier research by Zhang et al (2009a) found that in 2007, 6.3 million adults in the U.S. had undiagnosed diabetes, attributing to a cost of $18 billion. Furthermore, studies by Zhang et al (2009b) and Dall et al (2010) reported that fifty-seven million adults in that study were also estimated to have prediabetes, costing an additional $25 billion in medical spending.

Research has shown that diabetes is a controllable disease. The costs and the impact of diabetes on the population can be reduced through modification of lifestyle risks such as diet, exercise and smoking cessation, as well as, early diagnosis, appropriate health care, and self-management education (Taylor et al., 2013; Kentucky Department for Public Health, 2005; Bate & Jerums, 2003). The continuing increase in diabetes prevalence and costs indicates an urgent need to develop effective preventative measures and a process to successfully manage the disease (Martin & Lipman, 2013a).

The collaborative process of diabetes self-management education is a key component in improving the health outcomes and quality of life of people with diabetes. Despite this knowledge, suboptimal diabetes self-management has been identified as one of the possible causes of poor outcomes in diabetes care in general practice (Skovlund & Peyrot, 2005). There continues to be a gap between the results achieved in clinical trials and the outcomes in real world settings, especially in minority and underserved populations (Fradkin & Rodgers, 2013; Anderson & Christison-Lagay, 2008; Klug, Toobert & Fogerty, 2008). There is growing evidence that expanding diabetes education to non-traditional settings within the community can be effective in improving diabetes outcomes. Community interventions utilizing community health workers (CHW) may better reach populations that would not normally have access to education, offer the benefit of cultural relevancy and provide more convenient locations, especially for those residing in rural areas (Norris et al., 2002).

The Cooperative Extension System (CES) plays a key role in providing community outreach programs. There has been much documented regarding the Cooperative Extension System's efforts in diabetes education that address certain topics

such as healthy lifestyle, eating and cooking practices (Raidl et al., 2007; Chapman-Novakofski & Karduck, 2005; Christensen, Williams & Pfister, 2004.) However, there is little research pertaining to Cooperative Extension programs that compare to National Diabetes Self-Management Education (DSME) standards and guidelines.

The purpose of this study is to assess the role of the Cooperative Extension System in diabetes self-management education. By surveying Food, Nutrition and Extension Specialists and members of the Diabetes Community of Practice about the details of their diabetes education programs, we may be able to begin to fill the gap in research and better examine the impact of Cooperative Extension in diabetes self-management education.

Research Objectives

1. To determine the number of diabetes self-management programs conducted through the Cooperative Extension System (CES).
2. To examine how a diabetes self-management program is developed, implemented and evaluated.
3. To identify partners involved in diabetes self-management programs offered through CES.
4. To determine the impact of CES in diabetes self-management programs.

Justification

There is growing evidence that DSME can improve clinical measures, reduce complications and improves patient quality of life (Martin & Lipman, 2013). However, translating these results from clinical settings into the communities and populations most in need has been difficult. The CES has had great success in providing programming for low-income and underserved populations (Braun et al., 2014). Recently, with the rising prevalence of diabetes, there has been a shift in the current educational focus of CES to

develop and implement programs that address healthy lifestyle, and eating and cooking practices to prevent chronic diseases such as diabetes, particularly those with type 2 diabetes (Chapman-Novakofski & Reicks, 2013). By surveying the current efforts of CES in DSME, this information may be used in the future to design and evaluate DSME programs to better meet the evidence based standards and guidelines.

Assumptions and Limitations

The following assumptions were made during this study. This study assumed that the survey was valid and reliable. It was also assumed that the participants would be honest when answering the survey and would answer each question to the best of their ability. Some limitations of this study were that this survey was a small sample size and may not reflect all CES DSME programs in the United States. Also this study was sent to a wide variety of CES professionals compared to the small number of respondents. In the future, a survey sent directly to those who are responsible for DSME programming may be best.

Chapter Two

Review of Literature

This review of literature is divided into four main sections. The first section examines the benefits of self-management of diabetes. The second reviews diabetes self-management education (DSME). The third section reviews DSME in community-based settings and the fourth focuses on Cooperative Extension's role in DSME.

Self-Management of Diabetes.

This section gives a description of the self-management of diabetes and landmark studies demonstrating the effects of glycemic control. Much of the treatment of diabetes is based on a high level of self-management (Rygg, Rise, Gronning & Steinsbekk, 2012; Anderson & Funnell, 2010). Self-management refers to "the individual's ability to manage the symptoms, treatment, physical and psychosocial consequences and life style changes inherent in living with a chronic condition. Efficacious self-management encompasses the ability to monitor one's condition and to effect the cognitive, behavioral and emotional responses necessary to maintain a satisfactory quality of life. Thus, a dynamic and continuous process of self-regulation is established" (Barlow, Wright, Sheasby, Turner & Hainsworth, 2002).

Several landmark studies have demonstrated that people can reduce the risk of diabetes related complications in both type 1 and type 2 diabetes as well as, prevent or delay the onset of type 2 diabetes by learning necessary skills to effectively manage their blood glucose levels.

The Diabetes Control and Complications Trial (DCCT), a randomized control trial conducted from 1983-1993, looked at the effects of intensive glycemic control

versus standard glycemic control in patients with recently diagnosed type 1 diabetes. The results of this study showed that improved glycemic control is associated with significantly decreased rates of long-term eye, kidney and nerve complications by approximately 60% (DCCT Research Group, 1993). A follow up of DCCT participants, the Epidemiology of Diabetes Interventions and Complications (EDIC), further showed that a period of sustained glucose control helps to protect against long-term eye, kidney and nerve complications as well as heart disease, despite less intensive blood sugar control seen in the previous study (DCCT/EDIC Research Group, 2005; DCCT Research Group, 1993). Similarly, the United Kingdom Prospective Diabetes Study (UKPDS) showed that long-term complications of type 2 diabetes can be prevented through intensive blood glucose and blood pressure management. The study included almost 4,000 people with newly diagnosed type 2 diabetes resulting in decreases in death related to diabetes (20%), eye, kidney, and nerve diabetes complications (40%), blockage of the blood vessels to the lower limbs (40%) and heart attack (15%) (ADA, 2013b; King, Peacock & Donnelly, 1999).

The Diabetes Prevention Program (DPP, 2002) was a major multicenter clinical research study involving study participants from 27 clinical centers around the United States. The DPP aimed at discovering whether lifestyle interventions such as weight loss through dietary change and increased physical activity or treatment with the oral diabetes drug metformin could prevent or delay the onset of type 2 diabetes, in study participants at risk for developing the disease. The study found that lifestyle interventions were more effective that the drug metformin, with 50% of the participants in lifestyle interventions experiencing greater than 7% loss of body weight. Also, the incidence of diabetes was

reduced by 58% in the lifestyle intervention group and by 31% in the metformin group compared to the placebo group. Finally, compared with no prevention, self-management reduces a high-risk person's thirty-year chances of getting diabetes by about 11%, the chances of serious complications by 8%, and the chances of dying of a complication of diabetes by 2.3% (Diabetes Prevention Program Research Group, 2002).

Diabetes Self-Management Education and (DSME)

This section gives a description of DSME as well as discusses the desired outcomes and National Standards, guiding principles, and identifies barriers to DSME.

Description. Diabetes self-management education is recognized as a key component of effective diabetes care. Diabetes self-management education and training (DSME) is a collaborative process through which people with or at risk for diabetes gain the knowledge and skills needed to modify behavior and successfully self-manage the disease and its related conditions. This process incorporates the needs, goals, and life experiences of the person with diabetes and is guided by evidence-based strategies (American Association of Diabetes Educators [AADE], 2011). The overall goals and objectives of DSME/T are to support informed decision-making, self-care behaviors, problem-solving and active collaboration with the health care team in order to improve clinical outcomes, health status and quality of life (Hass et al., 2014; AADE, 2011).

Benefits of DSME. It has been shown that individuals with or at risk for developing diabetes can have an impact on the progression and development of their disease through intensive self-management activities (ADA, 2013b; DCCT Research Group, 1993; DCCT/EDIC Research Group, 2005). The importance of patients becoming active and knowledgeable in their own care has been expressed by both

national and global organizations. The International Diabetes Federation (IDF) recognizes DSME as "a critically important, fundamental and an integral component of diabetes prevention and care and should be available and accessible to everyone" (IDF, 2011, para. 3). The American Diabetes Association (ADA) found that there was a four-fold increase in diabetes complications in those individuals who had not received formal diabetes education regarding self-care practices (Mensing et al., 2006). This need is also recognized by Healthy People 2020. The United States government's health related goals for the nation, states the need to increase the proportion of people with diabetes who receive formal diabetes education from 52.8% in 2008 to 62.5% by the year 2020 (U.S. Department of Health and Human Services [HHS], 2010).

Steinsbekk, Rygg, Lisulo, Rise and Fretheim (2012) showed the effectiveness of group based DSME in improving clinical, lifestyle and psychosocial diabetes outcomes. This study compared group based diabetes self-management education with routine treatment, waiting list control or no treatment in a systematic review with meta-analysis including a total of 21 studies. The main outcome measurements were divided into short term (6 months) and long term (12 months) and 2 years or more. The main outcomes were Clinical (metabolic control measured by glycated hemoglobin and fasting blood glucose), Lifestyle (diabetes knowledge and self-management skills), Psychosocial (quality of life and empowerment/self-efficacy). The secondary outcomes were body weight; BMI; blood pressure; lipid profile (total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides); patient treatment satisfaction and death. For the main clinical outcomes, Results showed that A1C was significantly reduced at 6 months, 12 months and 2 years and fasting blood glucose levels were also significantly reduced at 12 months

but not at 6 months. For the main lifestyle outcomes, diabetes knowledge was improved significantly at 6 months, 12 months and 2 years and self-management skills also improved significantly at 6 months. For the main psychosocial outcomes, there were significant improvements for empowerment/self-efficacy after 6 months. However, for the secondary outcomes, there were no significant improvements in patients' satisfaction and body weight at 12 months, and there were no differences between the groups in mortality rate, BMI, blood pressure and lipid profile.

Hermanns, Kulzer, Ehrmann, Bergis-Jurgan and Haak (2013) reported similar results when comparing the efficacy of a self-management-oriented education program named PRIMAS (Programme for diabetes education and treatment for self-determined living with type 1 diabetes) for people with type 1 diabetes with an established education program DTTP (Diabetes teaching and treatment program) as a control group. DTTP focused on the technical aspects of living with diabetes whereas PRIMAS focused on the empowerment of type 1 diabetes patients, enabling them to make informed judgment and choices about their own diabetes care. The study was a randomized, multi-center trial, conducted in an outpatient setting with 160 patients with type 1 diabetes. Both the PRIMAS program and the CG consisted of 12 group lessons of 90 minutes each conducted by certified diabetes educators (CDE). The results showed that at follow-up (6 months) there was a significant 0.4 percentage points greater reduction of A1C in PRIMAS compared to the CG and dissatisfaction with diabetes treatment (insulin therapy) decreased more in PRIMAS. Furthermore, diabetes empowerment and diabetes self-efficacy increased in PRIMAS. These results indicated that a program using an empowerment approach is more effective in lowering A1C and also showed superiority

in reducing diabetes-related distress and increasing diabetes empowerment, diabetes self-efficacy and satisfaction with insulin therapy.

Norris, Engelgau and Narayan (2001) reviewed the effectiveness of self-management training in type 2 diabetes. A total of 72 studies demonstrated positive effects of self-management training on knowledge, frequency and accuracy of self-monitoring of blood glucose (SMBG), self-reported dietary habits, and glycemic control were demonstrated in studies with short follow up (<6 months). Effects of interventions on lipids, physical activity, weight and blood pressure were variable. However, interventions that used regular reinforcement throughout longer follow-up were effective in improving glycemic control.

Diabetes education has also been associated with decreased use of acute, inpatient hospital services and increased use of primary and preventative services. Robbins, Thatcher, Webb and Valdmanis (2008) evaluated the association of different types of educational visits for diabetes patients of the eight Philadelphia Health Care Centers (PHCC), with hospital admission rates and charges reported to the Pennsylvania Health Care Containment Council. The population included 18,404 patients who had a PHCC visit with a diabetes diagnosis and had at least one-month follow-up time. A total of 31,657 hospitalizations were recorded for 7,839 patients in the cohort. Results showed that any type of educational visit was associated with 9.18 fewer hospitalizations per 100 person-years and $11,571 less in hospital charges per person.

Duncan, Birkmeyer, Coughlin, Li, Sherr and Boren (2009) evaluated the impact of diabetes self-management education/training on financial outcomes. Commercial and Medicare claims payer-derived datasets were used to assess whether patients who

participate in diabetes education are more likely to follow recommendations for care than similar patients who do not participation diabetes education, and if claims of patients who participate in diabetes education are lower than those of similar patients who do not. Results showed that commercially insured members with diabetes education have lower claims for acute services and higher claims for primary and preventative services.

Desired outcomes and National standards for DSME. The AADE Outcome Standards for Diabetes Education define behavior change as the primary outcome of diabetes education. As previously mentioned, the overall objectives of DSME are to support informed decision-making, self-care behaviors and problem-solving and active collaboration with the health care team in order to improve clinical outcomes, health status and quality of life. In 1997, the AADE developed an evidence-based framework called the AADE 7 Self-Care Behaviors™, in order to guide the process of DSME towards a more outcomes-driven practice that focuses on patient centered goals. These seven self-care behaviors include (1) healthy eating, (2) being active, (3) monitoring, (4) taking medication, (5) problem solving, (6) healthy coping, and (7) reducing risks (AADE, 2011).

The AADE 7 Self-Care Behaviors™ have also been incorporated into the National Standards for Diabetes Self-Management Education and Support (Haas et al., 2014). These standards provide a comprehensive description of quality and effective guidelines intended to guide diabetes educators in evidence-based diabetes education and support. The Standards emphasize that the person with diabetes is at the center of the entire diabetes education and support process. Within these Standards, the term diabetes self-management support (DSMS) is used and defined as activities that assist the person with

prediabetes or diabetes in implementing and sustaining the behaviors needed to manage his or her condition on an ongoing basis or outside of formal self-management training. Furthermore, this type of support can be behavioral, educational, psychosocial, or clinical (Hass et al., 2014). The Standards address, in detail, the following ten recommendations for diabetes education and support: (1) Internal structure (2) External Input (3) Access (4) Program coordination (5) Instructional staff (6) Curriculum (7) Individualization (8) Ongoing support (9) Patient progress and (10) Quality improvement. These Standards are reviewed and revised approximately every five years. In order for organizations to seek Medicare reimbursement, they must meet these National Standards.

Guiding principles of DSME programs. Recently, diabetes education has taken a shift from didactic, knowledge-based presentation to a more patient-centered and empowerment approach (Haas et al., 2012; Funnell et al., 2009; Kulzer, Hermanns, Reinecker, & Haak, 2007; Funnell, Tang, & Anderson, 2007). In support of this shift, the ADA's Standards of Medical Care in Diabetes (2014) state that current best practice of DSME is a skills-based approach that focuses on helping those with diabetes make informed self-management choices. The empowerment philosophy emphasizes a collaborative approach to facilitating the self-directed behavior change of patients (Funnel et al., 2007). Naik, Teal, Rodriquez & Haidet (2011) compared the effectiveness of an empowerment approach to diabetes education with a traditional, clinic based diabetes education program. The goals of this study were to teach participants about the "diabetes ABC's" (A1C, systolic blood pressure and low density cholesterol). Eighty-four participants were randomized into either the empowerment-based intervention or the traditional health system-based diabetes education programs, both

were 3 months long. The empowerment intervention arm incorporated an active learning session aimed at increasing participants' awareness and use of the diabetes ABC's in their daily lives. Subsequent intervention sessions focused on goal setting, action planning, and active communication with ones physician. One general internist with nurse support facilitated all intervention sessions. Participants in the traditional education group received a 2 hour, didactic group session on diabetes self-management followed by a 5-10 minute individual review of each participants current diabetes ABC's. Both of the group and individual sessions were conducted by a certified diabetes nurse educator and followed the ADA's guidelines for patient education about diabetes. Participants completed a Diabetes ABC's questionnaire three months after enrollment. Results showed that the empowerment group has a significantly higher mean score overall compared to the traditional education group, as well as for each component item of the questionnaire. These results indicate that participants in the empowerment group were significantly more likely to accurately recall the clinical meaning of the diabetes ABC's, and were also much more likely to accurately recall their personal ABC values and provide a clinically reasonable target level for their ABC values compared with those in the traditional arm.

Another ADA guiding principle is programs that incorporate behavioral and psychosocial strategies are also associated with improved outcomes, as well as those that are culturally and age-appropriate (Funnel et al., 2009). A systematic review of behavioral change strategies used for lifestyle type 2 diabetes prevention programs showed that the elements utilized were derived predominantly from Social Cognitive Theory and the Stages of Change model, which is a component of the Transtheoretical

Model (Baker, Simpson, Lloyd, Bauman & Singh, 2011). Social Cognitive Theory specifies a core set of determinants, the mechanism through which they work, and the optimal ways of translating this knowledge into effective health practices. The core determinants include (1) knowledge (2) perceived self-efficacy (3) outcome expectations (4) goals (5) facilitators and (6) social and structural impediments (Bandura, 2004). The Transtheoretical Model is based on the premise that people are at different stages of motivational readiness for engaging in health behaviors and that intervention approaches are most useful when they are matched to a person's current stage of change (Ruggiero, 2000).

Spencer et al. (2011) tested the effectiveness of a culturally tailored, behavioral theory-based community health worker intervention for improving glycemic control. In this study, 164 African American and Latino adult participants with type 2 diabetes were randomly assigned into either a community health worker (CHW) intervention group or a control group in which the CHW intervention was delayed 6 months. CHWs were ethnically matched with their assigned participants, underwent more than 80 hours of training in empowerment-based approaches and conducted three primary activities: (1) diabetes education classes, which were culturally tailored in both English and Spanish (2) two home visits of about 60 minutes each per month to address participants' specific self-management goals, and (3) one clinic visit with the participant and his or her primary care provider. The results of this study showed that the intervention group had an improved mean A1C value of 7.8% from baseline 8.6% at 6 months, and there was no change among the control group. In addition, the intervention participants had

significantly greater improvement in self-reported diabetes understanding compared with the control group.

Attridge, Creamer, Ramsden, Cannings-John and Hawthorne (2014) reviewed 33 randomized controlled trials of culturally appropriate health education for ethnic and minority communities with diabetes from around the world. Culturally appropriate health education programs improved glycemic control (A1C) in participants compared with those receiving usual care at three, six, twelve, and twenty-four months post-intervention. In addition, three studies showed a significant improvement in health-related quality of life. Moreover, Knowledge scores improved in the intervention group at three, six, and twelve months post intervention.

Finally, ongoing support is critical to sustain progress made by participants during the DSME program (Funnel et al., 2009). Norris, Lau, Smith, Schmid and Engelgau (2002b) evaluated the effectiveness of DSME for individuals with type 2 diabetes on glycemic control as well as delineated the factors that contribute to its efficacy. A significant finding of this study was that glycosylated hemoglobin (GHb) improved with DSME, with an average change of -0.76% when measured at immediate follow up. The duration of contact time between the educator and patient was the only significant predictor of effect, with 23.6 hours of contact time needed for each 1% absolute decrease in GHb.

Piatt et al. (2010) determined whether or not improvements observed in clinical, behavioral, and psychosocial outcomes measured at 12 months were sustained at a 3-year follow-up. This study was a multilevel, non-blinded, cluster design, randomized controlled trial. Eleven primary care practices, and their patients were randomly assigned

to 3 groups: chronic care model (CCM) intervention, provider education only (PROV), and usual care. Subjects were followed for 3 years. The CCM intervention involved patient and provider education, as well as provision of other CCM elements in the community, including community partnerships and collaborations, delivery system redesign, decision support, clinical information systems and organization support. Provider-based diabetes education was offered to all providers via attendance atone problem-based learning (PBL) session. In addition, a certified diabetes educator (CDE) was placed in the practices on specified "diabetes days" and was available to all patients with diabetes and to the providers for consultation. In contrast, in the provider education only group (PROV), providers attended one PBL session and the CDE was not placed in the education practices but was made available for consultation. Provider in the UC group were mailed their practices chart audit report and decision support items consisting of ADA standards of care for people with diabetes, flow sheets that incorporated ADA guidelines, a packet of posters and information from Pennsylvania KeyPRO and the Lower-Extremity Amputation Prevention Program to assist in Complying with the ADA standards of care, and tracking of patient testing and results. The three year follow-up analyses showed that a multifaceted diabetes care intervention such as the CCM, demonstrated that improvements in A1C levels, blood pressure levels and the proportion of participants who self-monitor blood glucose, that were observed outcomes at 12 months follow-up, were sustained at three years Piatt et al. (2010).

Barriers to diabetes self-management and education. Despite strong evidence demonstrating the importance of diabetes education, DSME is being underutilized as a resource in diabetes care (Zgibor & Songer, 2001; Nagelkerk, Reick & Meengs, 2006),

and the majority of individuals living with diabetes and prediabetes do not receive any structured diabetes education (Haas et al., 2014). The self–management of diabetes is characterized by major lifestyle changes for both patients and their families and it is reasonable to believe that most individuals are likely to encounter barriers to care, posing major challenges in adhering to self-management programs. The literature includes some relevant information examining perceived patient and physician barriers to diabetes self-management and DSME.

One study discussed a series of topics including barriers to obtaining DSME, strategies for enhancing access/demand, nature of DSME received by patients, and satisfaction with DSME with diabetes educators, primary care physicians, and adults with type 1 or type 2 diabetes. Among barriers to obtaining DSME, one of the primary patient barriers to DSME was being unaware of DSME or their need for it. Another common barrier was the cost or lack of insurance coverage. In addition, several common logistical barriers were reported, including distant locations or lack of transportation and inconvenient times of service for working people. Furthermore, additional common patient limitations were language or literacy problems and physical limitations. Some of the physician barriers to DSME reported by diabetes educators and patients were, physicians often do not refer patients, or they downplay the seriousness of the disease. Physicians reported reasons for not referring patients as having concerns regarding the quality of the program and differences between physician and educator philosophies (Peyrot & Rubin, 2008). Similarly, Nagelkerk, Reick and Meengs (2006) found that lack of knowledge, specifically in terms of diet plans and access to resources, and understanding of their care plan, as well as, feelings of helplessness and frustration, were

the most frequently reported perceived patient barriers to self-management of their diabetes. In another study, Gucciardi, Demelo, Offenheim and Stewart (2008) examined factors that may contribute to attrition behaviors in diabetes self-management programs. Telephone interviews were conducted with 118 participants who withdrew prematurely from a diabetes education program. Participants were asked an open-ended questions regarding their discontinuation of services. Of the 118 nonusers, 97 provided reasons for discontinuing their use of DSME services. The responses were categorized as predisposing factors, enabling factors and need factors. Conflicts between patients' work schedules and center's hours of operation were the most frequently cited response for attrition under the enabling category. Several patients also reported not being reminded of their upcoming appointment and forgot to attend, as well as, distance from the center as barriers. Others stated that they thought seeing a specialist or primary care physician regularly was sufficient. Among predisposing factors, the majority of responses were associated with high level of self-efficacy in their ability to adhere to self-care activities, as well as participants' perceived confidence in the amount of diabetes knowledge already acquired. In contrast, embarrassment by an inability to adhere to management recommendations was also reported by patients as a reason for not attending. Other predisposing variables that were mentioned are apathy and a low priority attitude towards diabetes education. Lastly, in regards to need factors, several participants stated that physicians framed their diabetes as "mild" or "borderline", which may affect the patients' attitude toward the disease, use of DSME and adherence to self-care behaviors. The use of these terms may decrease a patients' sense of urgency to manage their diabetes aggressively.

Diabetes disproportionately affects ethnic minority and rural communities. Despite this, Strom, Lynch and Egede (2011) found that individuals who live in rural communities are less likely to receive diabetes education than those living in urban communities. There has been little research directly investigating factors affecting the use of DSME outside of academic medical settings, making it difficult to address population specific barriers to DSME. Some research has shown that DSME is more often used by those with type 1 diabetes, insulin-treated patients, those with complications, younger patients, those older than 70 years, African Americans, and those living in the Midwest (Peyrot & Rubin, 2008; Coonrod, Betschary & Harris, 1994; Glasgow, Toobert & Hampson, 1991). However, it is still unclear what it is about these characteristics that lead to the use of DSME.

Diabetes Self-Management Education in Community-Based Settings

This section reviews DSME programs in community settings, the use of community health workers, and the need for more diabetes educators in the future.

Roe and Thomas (2002) found that successful programs to close the gap in diabetes-related health disparities in various racial and ethnic populations are built on strengthening the links between health care providers and the community members they serve. In an attempt to bridge this gap, diabetes educators have focused on moving diabetes education out of hospitals and into non-traditional settings. Traditional sites include physician offices, outpatient clinics, home health agencies, hospitals, and nursing care facilities (Martin & Lipman, 2013). There have been several studies that focus on the implementation of DSME programs throughout various community settings. The DEPLOY study, funded by the National Institute of Digestive and Kidney Diseases

(NIDDK), aimed to determine if methods used in the Diabetes Prevention Program (DPP) could be applied in community based setting by non-research personnel. DEPLOY was taught by YMCA employees, and compared the weight loss benefits of a one-time counseling session with a 16-session intensive lifestyle management course. After 6 months, body weight decreased by 6% in intervention participants compared with 2% in controls. In addition, the intervention group showed greater changes in total cholesterol and results were sustained at 12 months (Ackermann, Finch, Brizendine & Marrero, 2008).

Community health workers (CHW), also known as community health advocates, lay health educators, community health representatives, peer health promoters, community health outreach workers, and promotores de salud have been described as "community members who worked almost exclusively in community settings. They serve as connectors between health care consumers and providers to promote health among groups that have traditionally lacked access to adequate health care." (CDC, 2010; Witmer, 1995). The Centers for Disease Control and Prevention (CDC, 2010) supports the unique role of community workers and advocates in closing the gap and facilitating access to care within their communities. The National Community Health Advisor Study helped to identify the core skills, competencies and services of almost 500 CHWs across the country, revealing seven core services: (1) bridging cultural mediation between communities and the health care system (2) providing culturally appropriate and accessible health education and information, often by using popular education methods (3) assuring that people get the services they need (4) providing informal counseling and social support (5) advocating for individuals and communities within the health and

social service systems (6) providing direct services and administering health screening tests and (7) building individual and community capacity (Rosenthal, Wiggins, Ingram, Mayfield-Johnson & De Zapien, 2011; CDC, 2010; Wiggins & Borbon, 1998).

Emerging evidence supports the use of CHWs, specifically in diabetes care and prevention. Recently, the ADA's updated National Standards for Diabetes Self-Management Education and Support, acknowledged the inclusion of health educators, case managers, lay and community workers, and peer counselors or educators as a part of the multidisciplinary teams involved in DSME (Haas et al., 2014). In addition, the AADE has released a position statement that supports the use of CHWs in diabetes care, education, and prevention (Albright et al., 2009).

A systematic review of the effectiveness of community health workers in diabetes care by Norris et al. (2006) was one of the first to review CHW specific to diabetes care. The review revealed preliminary data that demonstrated improvements in participants' knowledge and behaviors such as diet, physical activity, self-monitoring of blood glucose and other self-care behaviors. Several studies using CHW and community members that have been published more recently have reported similar results. Walton, Snead, Collinsworth and Schmidt (2012) reported that the implementation of a CHW-led DSME program titled the "Diabetes Equity Project", showed significant improvements in participants glycemic control with patients mean A1C levels dropping from 8.7% to 7.4%. Thompson, Horton and Flores (2007) used CHW's as extenders of the medical staff to facilitate behaviors change using patient centered counseling. Results from this study also showed that patients with a higher frequency of CHW contact had significant improvements in A1C levels, as well as, LDL cholesterol and blood pressure. The

Healthy Changes™ program used a peer-led group format to promote healthful eating practices and physical activity. Participants from this study showed improvements in health behaviors such as diet and physical activity, in addition to dietary and exercise self-efficacy and use of community resources at 4, 8 and 12 month follow-ups (Klug, Toobert & Fogerty, 2008).

The demand for diabetes educators is projected to increase significantly through 2025 (DaVanzo, Dobson, El-Gamil & Freeman, 2011). The Patient Protection and Affordable Care Act (ACA) has committed to expanding federal qualified health centers (FQHCs) and other community health centers (CHCs), which will further generate more demand for CHWs as diabetes educators. It is expected that DSME/T will continue to increase in non-traditional settings, and with this growing will come an expanding base of employers of diabetes educators (Martin and Lipman, 2013; DaVanzo et al., 2011).

The Role of the Cooperative Extension System in DSME

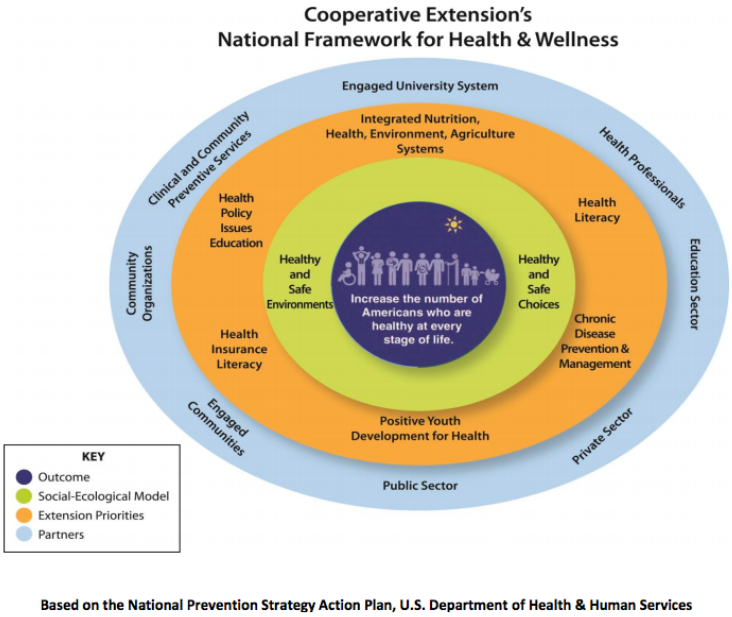
This section will discuss the background and history of the Cooperative Extension System and their current efforts in diabetes education.

Background. The Cooperative Extension system is a nationwide, noncredit educational network through more than 100 land-grant universities, funded by the National Institute of Food and Agriculture in cooperation with state and local governments. Extension professionals take on a variety of roles. Within universities there are Extension Specialists, who are usually professors within a university academic department and are typically involved in developing and evaluating educational programs and strategies and providing training and ongoing support for county Extension educators. Extension educators, agents or unit leaders within the counties of each state,

may be generalists with broad backgrounds in Family and Consumer Sciences, or in some states have specialized nutrition/dietetics training (Chapman-Novakofski, 2013).

National framework. The Extension Committee on Organization and Policy has recently aligned Cooperative Extension's National Framework for Health and Wellness with the U.S. Department of Health and Human Services' National Prevention Strategy: Strategic Directions (Braun et al., 2014). The overall goal of this framework is to "Increase the number of Americans who are healthy at every stage of life." (Figure 1)

Figure 2.1. Cooperative Extension's National Framework for Health and Wellness



Source: Braun et al., 2014.

In the development of this framework, a strategic analysis of Cooperative Extension strengths and limitations relative to health programming were identified. Following a review of trends and analysis of Cooperative Extension's assets and limitations, six Strategic Program Priorities (Figure 1) were developed, including "chronic disease prevention and management" (Braun et al., 2014).

CES diabetes education programs. In order to accommodate the rapidly increasing rates of diabetes in the country, Cooperative Extension has expanded its efforts to target people with type 2 diabetes (Archuleta, VanLeeuwen, Halderson, Wells & Brock, 2012). As previously mentioned, the ADA recommends education programs that are skills based and focuses on making informed choices (ADA, 2014). Although it does not provide diabetes education, the success of the nationwide Expanded Food and Nutrition Education Program (EFNEP), can attest to Cooperative Extension's ability to deliver this type of education. The EFNEP program incorporates hands-on food preparation and tasting, and has been shown to improve dietary patterns among participants (Archuleta et al., 2012; United States Department of Agriculture [USDA], 2015).

Diabetes education programs such as the University of Idaho's *Healthy Diabetes Plate* curriculum collaborated with dietitians and certified diabetes educators to develop a four-lesson curriculum using the plate format to teach individuals about the type and amount of foods they should consume at each meal (Raidl et al., 2007). Family and Consumer Science extension educators taught the curriculum, in three urban and five rural counties. Adult participants were recruited through the county extension newsletter and selected through nonrandom sampling. Each of the four lessons focused on teaching participants how to plan meals correctly using the Idaho Plate Method (IPM) model, which follows the nutritional guidelines of the ADA and Academy of Nutrition and Dietetics, formerly named the American Dietetic Association. Lesson one covered basic information on diabetes (signs and symptoms) and introduction to the IPM, including information on the five food groups and how they fit on the plate. Participants were

divided into three groups and instructed to plan a breakfast, lunch or dinner meal using a meal-planning sheet. In lessons two, three and four, participants learned how to plan meals in three different settings: the home, using foods they typically eat at home; the supermarket, using new foods introduced during the supermarket tour; and a restaurant or fast food establishment. Evaluation of the program was done using pre- and post-curriculum surveys and meal planning activities. Results showed that participants had significant increases in daily fruit and vegetable consumption. In addition, a high percentage of participants were able to plan their meals correctly in the home setting (86-97%), supermarket setting (88-96%) and in the restaurant and fast food setting (90-99%) (Raidl et al., 2007). Moreover, when participants residing in an urban area called to register for the class, several commented that they either could not afford the cost of diabetes education classes at their own local hospital or that they had taken a class but did not understand most of it. Furthermore, residents in rural counties commented that this was the first time diabetes classes had been offered in the county. Results from this study suggest possible solution to two very common problems or barriers to diabetes education—understandability and accessibility. The high percentage of participants correctly planning their meals indicates that the curriculum, led by Family and Consumer Science (FCS) extension educators, was easy for participants to understand, in addition, because it was offered in both rural and urban counties, diabetes education became accessible to the underserved population. Furthermore, participants in this study revealed that they preferred attending extension classes rather than visiting their physician or attending hospital classes (Raidl et al., 2007).

The *Diabetes Stepping Up to the Plate* curriculum offered through Utah State University Extension was a 3-month diabetes education course focused on food portioning skills (Christensen, Williams & Pfister, 2004). Participants with type 1 or type 2 diabetes or who were at risk for developing diabetes, were recruited through newspaper advertisements, community newsletters, and flyers placed in public county buildings. The program curriculum and data collection tools were developed by senior dietetic students, and reviewed by a University Extension nutrition specialist and a University Extension agent who were both registered dietitians. The curriculum consisted of seven classes starting and ending with an evaluation session to assess knowledge of nutrition and food portioning skills and measurement of A1C and anthropometric indices. The remaining five classes contained three core sessions on portion control, label reading and adjusting recipes and two specialty classes, covering cooking for the holidays or special occasions, planning meals on a limited budget, eating out and situational obstacles to dietary adherence, which were chosen by the group. In addition, participants drafted their own meal plans based on self-chosen calorie levels to meet the recommendation of the Food Guide Pyramid. Pre and post course anthropometric measurements, a written food portion test, an observational food portion test, and an A1C test were administered and scored. Results showed improved nutrition knowledge, anthropometrics measures and glucose control. A medical costs savings related to hospitalization of $94,010 was also calculated, indicating that programs led by Cooperative Extension can be both clinically and cost-effective (Christensen, Williams & Pfister, 2004).

The Dining with Diabetes curriculum originated in the West Virginia Extension Service (Chapman-Novakofski & Karduck, 2005). The curriculum consisted of three

group lessons focused on meal planning with cooking demonstrations and was implemented in 11 counties. Participants in this study were recruited from newspapers, physicians' offices, and radio advertisements. The goals of this program were to increase knowledge of healthful food choices for those with diabetes. The three lessons included: desserts, main dishes, and side dishes. At the end of the class, recipe demonstrations and taste testing emphasized key concepts. The program incorporated components of Social Cognitive Theory and stages of Change Theory in the development of their demographics, knowledge and questionnaires. Knowledge questions focused on the identification of carbohydrates, artificial sweeteners, the Food Guide Pyramid, the nutrition facts label, types and sources of fats, and the importance of fiber in the diet. The Stages of Change Theory was reflected in four questions. The Social Cognitive Theory was used in six questions regarded self-efficacy of carbohydrate control, dietary adherence, blood glucose monitoring, and level of difficulty in meal preparation for diabetes. The results showed that responses to the knowledge questionnaire were significantly better at post-test. Significant improvements in Social Cognitive Theory items included having confidence in changing one's diet, in preparing healthful meals, in using the nutrition facts label, and in overcoming the degree of difficulty in meal preparation. Moreover, most participants moved at least one stage in the Stages of Change, most of them to an action or maintenance stage (Chapman-Novakofski & Karduck, 2005).

Conclusion

The prevalence of diabetes continues to increase globally and nationally, causing an enormous burden to the individual affected by the disease, as well as the health care

systems treating them. Diabetes is not curable, but it is manageable. Through active participation in their own care, individuals with diabetes can dramatically impact the outcome of their disease. DSME has been shown to be effective in reducing the risks of diabetes related complications in both type 1 and type 2 diabetes and preventing or delaying the onset of type 2 diabetes in those at risk for developing the disease. Despite this evidence, diabetes self-management education is being underutilized as an essential component of care. Individuals affected by diabetes encounter several barriers to the self-management of their disease and DSME, including lack of knowledge or understanding of their disease and accessibility of the available programs. Community-based DSME have shown to be an effective solution for bridging the gap between healthcare providers and the community members. Furthermore, the Cooperative Extension system is uniquely positioned to implement DSME programs and services due to their strong connections with the communities that they serve. This literature review supports research that suggests the need for individuals to have access to diabetes self-management education within their community, yet it is lacking detail pertaining to Cooperative Extension as the source for that education.

Chapter Three

Methodology

The purpose of this study is to determine Cooperative Extension's involvement and impact on DSME programming based on the National Standards for Diabetes Self-Management Education and Support.

Research Design

This study used a descriptive research design using mixed methods research questions. The descriptive research method was chosen because it provides information about the characteristics of a particular group, in this case, Cooperative Extension Specialists and their implementation of DSME. A descriptive design is one of the best methods for collecting information that describes the world or a situation as it exists. Like all research, the goal of descriptive research is to test hypotheses and answer questions. However, unlike experimental research, descriptive research is not equipped to test cause—effect hypotheses and therefore cannot answer questions about the "whys" (causes) of behavior. Instead, it can help us answer the "what", "who," "when," and "where," questions (Mitchell & Jolley, 2012, p. 224). Brickman and Rog (1998) states that this is the most sensitive method to providing answers to the question "what is?" In this case, what is Cooperative Extension's role in DSME programming? Mixed methods involve the collection of both qualitative (open-ended) and quantitative (closed-ended) data. Mixed methods were chosen because of its strength of drawing on both qualitative and quantitative research and minimizing the limitations of both approaches (Creswell, 2013). In this study, much of the data were analyzed quantitatively. However, the survey contained some questions that must be interpreted qualitatively.

Subjects

The population included all members of the United States Department of Agriculture (USDA) Food, Nutrition and Affiliated Areas State Extension Directory, consisting of extension professionals with leadership and statewide responsibility at Land-Grant institutions who are involved in food, nutrition and affiliated or related areas. This directory consisted of approximately 290 members. In addition, the population included approximately 100 members of the eXtension Diabetes Community of Practice group. eXtension is a national internet-based educational network that complements the community-based Cooperative Extension System. To avoid duplication, the names of members of this group were removed if their names were on the USDA Food, Nutrition and Affiliated Areas State Extension Directory. One list was compiled with the information from both groups.

Instrument of Measurement

A survey instrument designed to collect quantitative and qualitative data was developed for the study. The instrument consisted of 28 questions, measuring three main sections. Section 1 contained four questions related to participant and program demographics. For example, "does your university offer diabetes programming through the Cooperative Extension System?' and "In what state or affiliated area do you offer diabetes education?" Section 2 contained 22 questions measuring key components of program planning including development, implementation and evaluation. Ten questions focused on program development such as target audience, goals, program design, groups involved in developing the program, program length and the content; ten questions explored the implementation process and measured program management, identified

educators, recruitment and marketing methods, partnerships and collaborations, and funding. Two questions explored the evaluation of the programs as they pertain to the measurement of outcomes and reporting on effectiveness of program. Section 3 consisted of two open-ended questions that explored challenges CES Specialist experienced while implementing DSME programs and their thoughts about the future direction of CES related to DSME. IRB approval was sought and gained prior to distribution of the survey.

The survey was developed using Qualtrics, a software website used to develop surveys. A characteristic of this software is skip logic, which allowed for participants to skip questions that did not pertain to them. For example, simply because a participant was a member of the Food, Nutrition and Affiliates Areas directory, or a member of the eXtension Diabetes Community of Practice group does not mean that their institution actually offers DSME programming through CES or that they are the person responsible for offering the programming. A participant in these situations would have no valid information with which to answer questions about DSME programming. Therefore, when they provided this information at the beginning of the survey, it automatically skipped to the end of the survey. Skip logic was also used to redirect participants away from questions that did not pertain to them based on a previous answer choice. For example, participants were asked "do you have funding, other than CES, for your program?". If participants answered "yes", then they would be redirected to another question regarding who they receive additional funding from. If participants answered "no", they would move on to the next question in the survey.

Validity and Reliability

Questions were tested for content validity. Two Cooperative Extension Specialists involved in DSME developed survey questions. The development of survey questions was guided by the CDC Framework for Program Evaluation (CDC, 2012), as well as, the National Standards for Diabetes Self-Management Education and Support (Haas et al., 2013). Questions were pilot tested with individuals in Cooperative Extension who were not part of the study and those who implemented DSME programs but were not part of the Cooperative Extension System as well as with member of faculty members of the University of Kentucky. Appropriate changes were made as a result of feedback received.

Procedure

The directory for the USDA's Food, Nutrition and Affiliated Areas State Extension Directory was accessed online and used to contact members regarding participation in the research study. Permission was obtained to contact the members of the eXtension Diabetes Community of Practice from one of the leaders of the group. A pre-email was sent to the members on both lists, informing them that they would receive a survey link in an email within the next few days and encouraging them to participate in the study. Emails were sent with a link to the Qualtrics website containing a clickable link to the survey. The emails were successfully sent to approximately 382 Cooperative Extension professionals and CoP members. Four, $25.00 gift cards to Barnes and Noble, was offered as incentive to complete the survey. A total of three reminder emails were sent out weekly to encourage participation.

Data Analysis

The raw data collected by the survey in this study were downloaded from Qualtrics and uploaded into IBM SPSS Statistics Version 22.0 for statistical analysis. Because Qualtrics did not allow for elimination of incomplete responses, some of the questions were missing responses. Answers were weighted to account for these missing answers. Descriptive statistics were used for a majority of the data collected. Specifically, frequencies and cross-tabulations were performed.

Data for the open-ended responses were analyzed using content analysis (Krueger & Casey, 2008). Codes were assigned to each response and themes or categories were formed. In order to provide verification, two researchers independently coded the transcripts and derived themes. Common themes were discussed to establish consensus. A 95% reliability was established.

Chapter Four

Results

This survey used a skip logic format. As a result, participants were allowed to skip questions that did not pertain to them. The percentages listed reflect the percentage of programs represented in that question. In addition, several questions allowed participants to select "all that apply". Under the advisement of a statistician and to provide the most accurate data, percentages for these questions were analyzed by finding the "percent of programs" being represented in that question, rather than "percent of participant responses" and, therefore, exceed 100%. Participants were also given the opportunity on several questions to provide additional information pertaining to the questions in the section headed "Other". These questions were analyzed independently using content analysis.

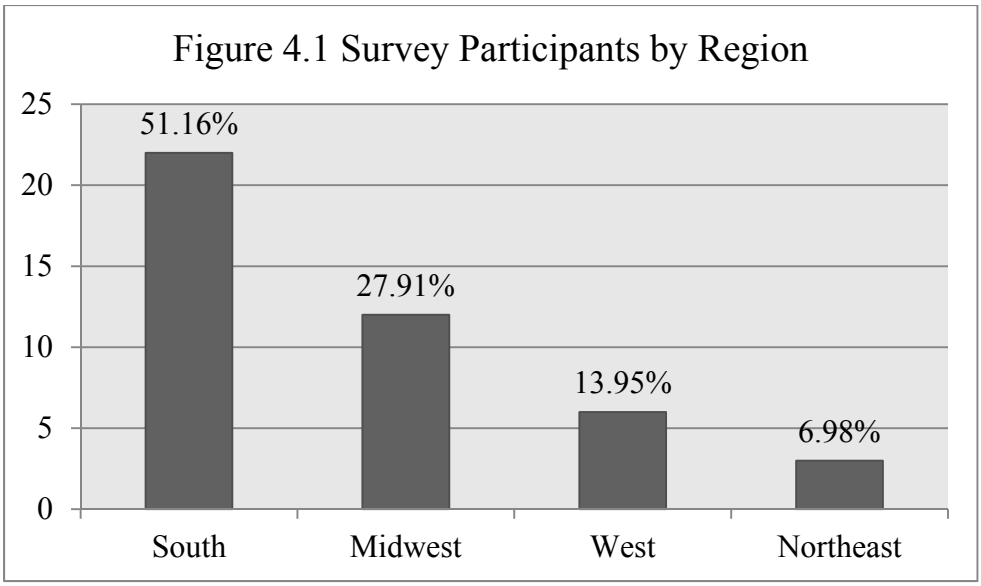
For the purpose of providing more specific context with which to interpret the results, the states where participants or universities were located were divided into five regions, South, Midwest, Northeast, West and Other, according to the U.S. Census Bureau Regions and Divisions of the United States. See Appendix B. Those that were not included on this map were designated "Other" and included, the Virgin Islands, Puerto Rico, Commonwealth of Northern Mariana Islands, Micronesia and American Samoa.

Objective 1: To Determine the Number of Diabetes Management Programs Conducted by the Cooperative Extension System (CES).

The survey was sent to 382 participants. Of these, 161 participants responded, resulting in a 42.1% response rate. The first section of the survey asked participants to

indicate if their university offers diabetes education programming through the Cooperative Extension System (CES). Of the 161 participants, 115 (71.4%) indicated that their university offered diabetes programming through CES. Forty-six (46) participants (28.6%) did not offer diabetes programming and were directed out of the survey. Next participants were asked if they were the person responsible for working with diabetes education programming. A total of 43 (37.4%) participants stated that they were the person responsible, while 72 (62.6%) participants indicated that they were not the person responsible for working with diabetes programming and were directed out of the survey.

The 43 participants were asked to select the state in which they offer diabetes education programs. Twenty-nine unique states were listed, and some states had more than one university offering diabetes education programs. For example, Arkansas (n=4, 9.3%) and Tennessee (n=4, 9.3%) had the greatest number of participants in their state. When broken down by region, the South had the highest number of participants offering programs in this survey (n=22, 51.16%), followed by the Midwest (n=12, 27.91%), West (n=6, 13.95%), and Northeast (n=3, 6.98%). There were no responses from those designated in the "Other" category for this question. See Figure 4.1.



Participants were then asked if their university offers more than one diabetes education program. Twenty-one (48.8%) participants indicated that their university offered only one program. Twenty-two (51.2%) offered more than one diabetes education program. Of the 22 universities offering more than one diabetes education programs, 14 (32.6%) offered two programs representing a total of 28 diabetes education programs and eight (18.6%) offered three programs representing a total of 24 diabetes education programs. A total of 73 diabetes education programs were represented in this survey.

Objective 2: Program Development, Implementation and Evaluation

Participants indicating that they offered more than one diabetes education program were given the opportunity to answer the survey questions for up to three programs. For the purpose of providing more specific context with which to interpret the results, the data were analyzed individually by number of programs offered, and are

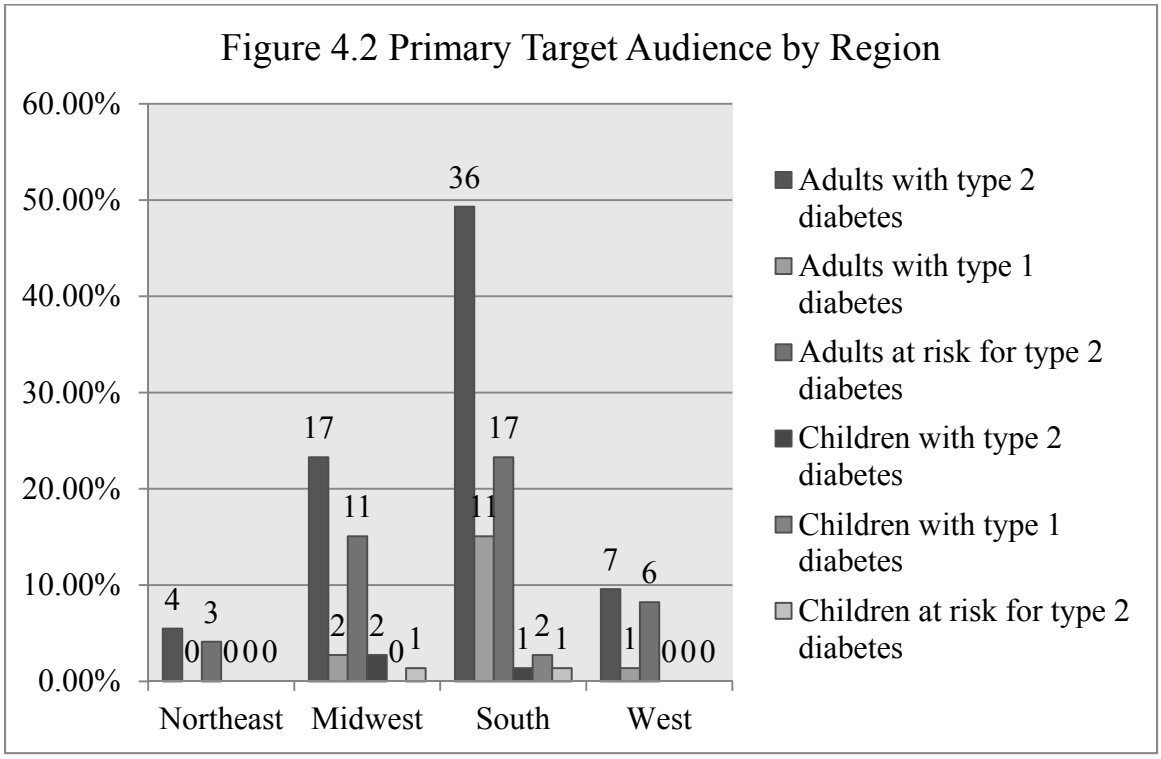
hereafter referred to as universities offering, "one program", "two programs", or "three programs". Under the advisement of a statistician, these individual sets of data were then manually combined and analyzed and are referred to as "all programs".

Program Development. Participants were asked to identify the primary target audience for their program. A list of possible target audiences was provided, and the option was given to "select all that apply" as well as an option to list any other target audience under "other". When examining all programs together, adults with type 2 diabetes (n=64, 87.7%) and adults at risk for type 2 diabetes (n=37, 50.7%) were the most frequently targeted audiences overall, while fourteen (14) programs targeted adults with type 1 diabetes (19.2%). The least targeted audiences overall were children, with only a total of seven programs. Three (3) programs (4.1%) targeted children with type 2 diabetes, two (2) programs (2.7%) targeted children with type 1 diabetes, and two (2) programs (2.7%) targeted children at risk for type 2 diabetes. See Table 1.

Universities that offer one, two or three programs, all targeted adults with type 2 diabetes followed by adults at risk for type 2 diabetes the most. Universities offering two and three programs had adults with type 1 diabetes as their third most targeted audience. Universities offering three programs targeted children with type 2 diabetes as their fourth. This was not so for universities that offered two programs. See Table 4.1.

Table 4.1 Primary Target Audience								
	Universities offering 1 Program		Universities offering 2 Programs		Universities offering 3 Programs		All Programs	
	Number of programs	Percent of Programs (N=21)	Number of programs	Percent of Programs (N=28)	Number of programs	Percent of Programs (N=24)	Number of programs	Percent of Programs (N=73)
Adults with type 2 diabetes	20	95.24%	25	89.29%	19	79.17%	64	87.67%
Adults with type 1 diabetes	0	0.00%	9	32.14%	5	20.83%	14	19.18%
Adults at risk for type 2 diabetes	10	47.62%	15	53.57%	12	50.00%	37	50.68%
Children with type 2 diabetes	0	0.00%	0	0.00%	3	12.50%	3	4.11%
Children with type 1 diabetes	0	0.00%	1	3.57%	1	4.17%	2	2.74%
Children at risk for type 2 diabetes	0	0.00%	1	3.57%	1	4.17%	2	2.74%

When analyzing the data by regions, adults with type 2 diabetes were the most frequently targeted audience by all regions. The South had the highest percentage of programs targeting adults with type 2 diabetes, adults with type 1 diabetes, adults at risk for type 2 diabetes and children with type 1 diabetes. The Midwest had the highest percentage of programs targeting children with type 2 diabetes. The Midwest and the South lead in programs targeting children at risk for type 2 diabetes. See figure 4.2.



Participants used the "Other" text box to list additional target audiences. The most commonly listed answers were categorized in the following: caregivers and family members (n=5), people at risk for diabetes (n=3), those supporting people with diabetes (n=2), healthcare professionals (n=1), those with polycystic ovary syndrome (PCOS) (n=1), those with insulin resistance (n=1), those with a past diagnosis of gestational diabetes (n=1), spouses (n=1), and others with weight problems (n=1).

Participants were asked to list the goals of each diabetes education program. Content analysis was used to analyze the responses. Most goals were related to diabetes self-management. Additionally, many participants stated more specific goals related to self-management techniques such as, healthy eating, physical activity, healthy cooking techniques, and diabetes basics. Some healthy eating goals listed were to "teach persons with diabetes to reduce sugar, salt, and fat in foods, without giving up good taste," and "increase knowledge of healthy food choices for families with diabetes or other chronic diseases." Another participant listed a goal to improve "self-efficacy regarding making healthful food choices." Reading food labels and carb counting were also mentioned. Specific goals related to physical activity included " [to] promote physical activity as a component of diabetes control," and "to increase the number of individuals who engage in the recommended [amount of] physical activity." Two participants listed specific physical activity recommendations as goals such as "150 minutes of physical activity/week" and "getting 30 minutes of physical activity daily." Goals related to healthy cooking techniques included meal planning, preparation, cooking demonstrations. For example, one participant stated "to develop confidence in planning and preparing meals for individuals with diabetes" and another said "demonstrate cooking techniques that use more healthful ingredients." More specific goals related to teaching diabetes basics were also listed. One participants stated a goal to "educate adults who have diabetes to understand the basics of the disease and to teach them to monitor the numbers that are important," while another said that "getting basic information on self-management to the individuals [and] helping participants to understand diabetes in the most simple way . . ." was a goal of their program. Although not as prevalent, additional

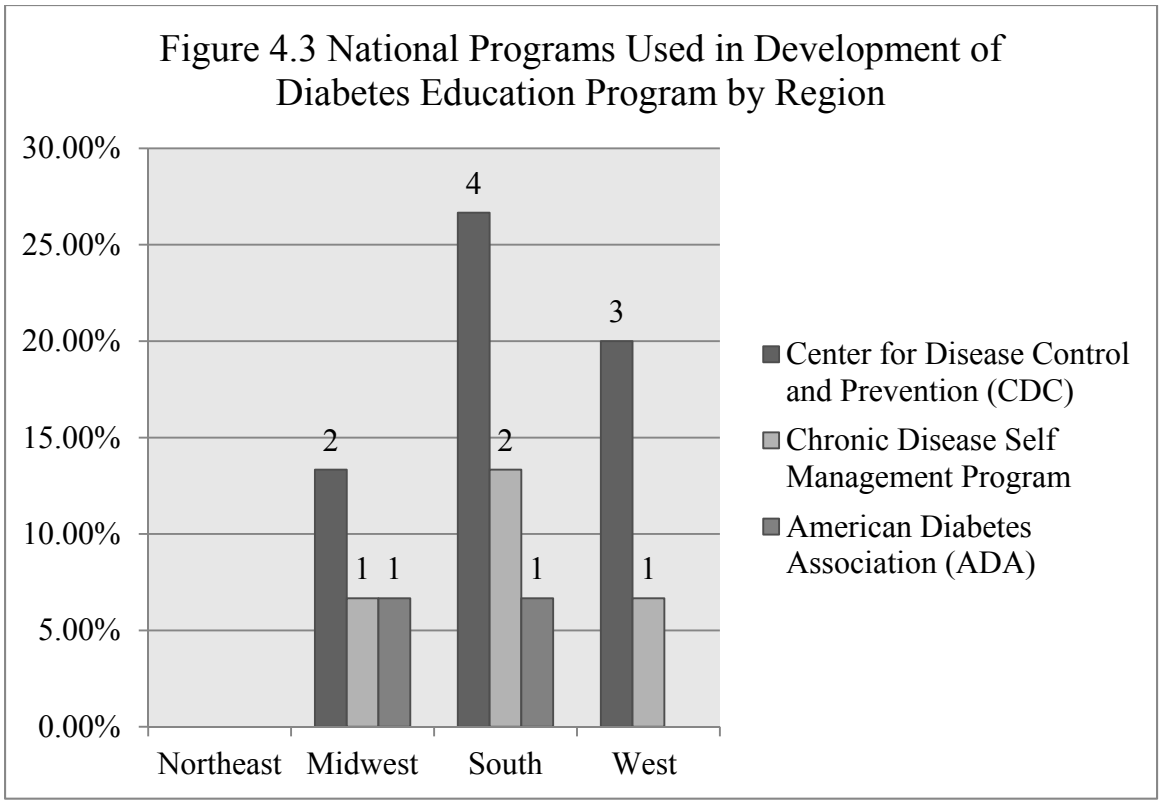
goals were also mentioned under the following categories: provide non-biased, research based information, improve communication with doctor or healthcare provider, goal setting and problem solving, diabetes prevention, improve self-efficacy, provide peer learning and support, taking medication, self-monitoring numbers, learning symptoms, promote behavior change and weight loss.

Participants were then asked whether their university developed their program. Approximately 45% (n=33) of participants indicated that their university developed their program, while 54.8% (n=40) responded that their university did not develop their program. To follow up this question, participants indicating that their organization did not develop their program were asked if they used a program developed by a National group and were given the option to select all that apply from a list of options. When examining all programs, the most used National Program was the CDC (n=9, 60%), followed by the Chronic Disease Self-Management Program (n=4, 26.67%) and the ADA (n=2, 13.33%). Table 4.2 depicts the data for this question.

Table 4.2 National Programs Used in Development

	Number of Programs	Percent of Programs (N=15)
Center for Disease Control and Prevention (CDC)	9	60.00%
Chronic Disease Self Management Program	4	26.67%
American Diabetes Association (ADA)	2	13.33%
Total	15	100.00%

When analyzing data by regions, the CDC was the most used National Program in the development of diabetes education programs in the Midwest, South and West, while the Northeast did not indicate using any of these National programs. Figure 4.3 provides a visual representation



Participants used the "Other" text box to provide additional sources used in the development of their programs. Most participants listed the program developed by West Virginia Extension (n=13), followed by Stanford University (n=3). Two participants simply listed programs developed by "Cooperative Extension", and two participants listed programs developed by the American Association of Diabetes Educators (AADE)(n=1) and the University of Florida Cooperative Extension (n=1).

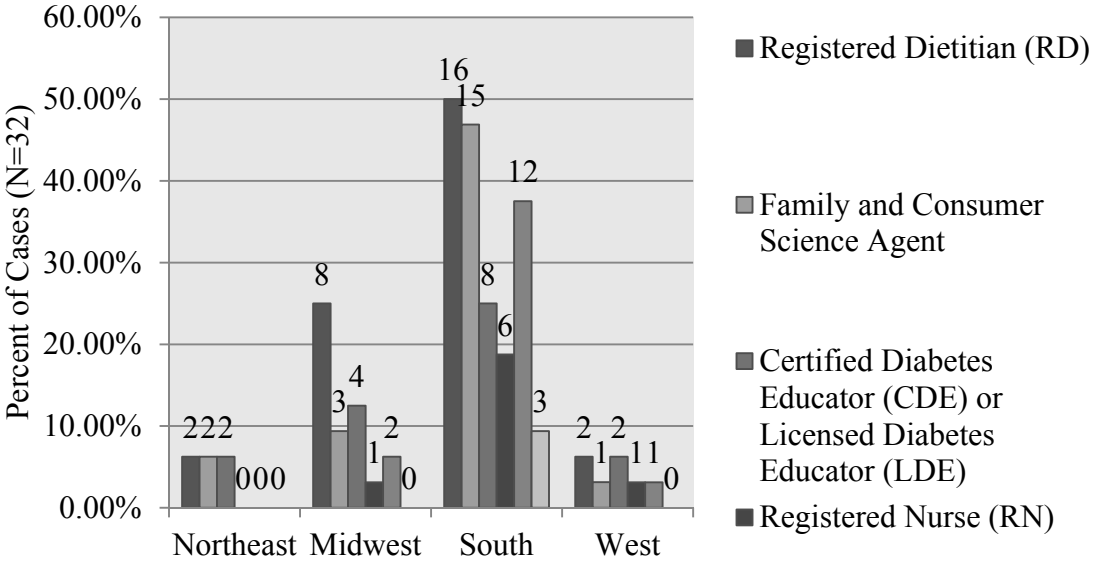
Participants were also asked to select the people or group involved in the development of their program. Most participants indicated that a registered dietitian (n=26, 81.25%) and a family and consumer science agent (n=20, 62.50%) were involved in the development of their program. Fourteen (43.75%) participants indicated that a certified or licensed diabetes educator was involved and 11 (34.38%) indicated that a

registered nurse was involved in the development of their program. A total of six participants indicated that either a college level nutrition educator (n=5, 15.63%) or an endocrinologist (n=1, 3.13%) was involved in the development of their program. Table 4.3 depicts the results to this question.

Table 4.3 People Involved in Development of Programs		
	All Programs	
	Number of Programs (n)	Percent of Programs (N=32)
Registered Dietitian (RD)	26	81.25%
Family and consumer science agent	20	62.50%
Certified Diabetes Educator (CDE) or Licensed Diabetes Educator (LDE)	14	43.75%
Registered Nurse (RN)	11	34.38%
College level nutrition educator	5	15.63%
Endocrinologist	1	3.13%

When analyzing all programs by region, programs in the Northeast, Midwest and West indicated that a registered dietitian, family and consumer science agent and certified or licensed diabetes educator were the most involved people in the development of their programs. The South indicated that a registered dietitian, family and consumer science agent and a college level nutrition educator were the most involved. In addition, the South was the only region to indicate using all of the options provided and the only region to use an endocrinologist in the development of the programs in that region.

Figure 4.4 People Involved in Development of Diabetes Education Program by Region



Participants used the "Other" text box to provide additional people or groups involved in the development of their program. A variety of answers were given including extension educators (n=2), graphic artist (n=1), individuals with diabetes (n=1) paraprofessionals (n=1), and other extension agents (n=1). One participant listed " I locate materials available from other extension agencies when a request is made that is not included in [their curriculum]."

Participants were asked to list the length of their diabetes education program in number of weeks and number of classes. The number of weeks that universities offered programs ranged from one to fifty-two weeks, and the number of classes from one to twenty-four classes. Four weeks (n=12, 22.2%) was the most frequently listed program length in weeks, as well as four classes (n=12, 23.5%). The average length of programs in weeks was nine, and the average number of classes was eight.

Participants were asked to select how their program was delivered. A list of possible modes of delivery was provided and the option was given to "select all that apply" as well as an option to list additional information under "other". When analyzing all programs, group sessions (n=51, 92.73%) and face-to-face (n=38, 69.09%) were by far the most popular modes of delivery. Less than one-fourth of the programs used individual sessions (n=7, 12.73%) or on-line (n=4, 7.27%) as methods of delivery. Participants used the "Other" text box to provide additional modes of delivery for their programs. Two responses were "educational TV statewide" and "TV".

Participants were also asked to "select all that apply" regarding the topics that are included in their diabetes education programs. When analyzing by all programs, healthy eating (n=53, 98.2%) was the most common topic included by nearly all programs, followed closely by being active (n=48, 88.9%) and reducing risks (n=43, 79.6%). Approximately 70% of the programs covered problem solving (n=38, 70.4%) and healthy coping (n=38, 70.4%). Thirty-seven (37) programs (68.5%) included monitoring and 26 programs (48.2%) included taking medication as part of their education. See Table 7.

Results were similar when analyzing by number of programs offered. Healthy eating and being active were the two most common topics whether universities offered one, two or three programs. Taking medications was one of the topics least included in diabetes education programs, regardless of the number of programs offered by universities. Table 4.4 shows the results to this question.

Table 4.4 Topics Included in Diabetes Education Programs								
	Universities offering One Program		Universities offering 2 Programs		Universities offering 3 Programs		All Programs	
	Number of Programs (n)	Percent of Programs (N=16)	Number of Programs (n)	Percent of Programs (N=20)	Number of Programs (n)	Percent of Program (N=18)	Number of Programs (n)	Percent of Programs (N=54)
Healthy Eating	16	100.00%	20	100.00%	17	94.44%	53	98.15%
Being Active	16	100.00%	17	85.00%	15	83.33%	48	88.89%
Monitoring	12	75.00%	15	75.00%	10	55.56%	37	68.52%
Taking Medication	4	25.00%	10	50.00%	12	66.67%	26	48.15%
Problem Solving	9	56.25%	14	70.00%	15	83.33%	38	70.37%
Reducing Risks	12	75.00%	17	85.00%	14	77.78%	43	79.63%
Healthy Coping	10	62.50%	13	65.00%	15	83.33%	38	70.37%

Participants used the "Other" text box to provide more specific topics included in their diabetes education programs. The majority of the topics listed were elaborating on *healthy eating* and included label reading (n=2), carb counting (n=1), portion control (n=1) and weight control (n=1). One participant stated " . . . choosing healthy fats, carbohydrates, and fiber, [and] modifying recipes", another listed "healthy cooking methods." In addition, one participant elaborated on the *reducing risks* topic and listed "foot care". Additional topics included "all areas of diabetes self management" (n=1), diabetes symptoms (n=1), health consequences (n=1), "what is diabetes?" (n=1) and empowerment and goal setting (n=1).

Program implementation. Participants were asked who currently teaches or has taught their program. A list of possible options was provided and the option was given to "select all that apply" as well as an option to list additional information under "other". When analyzing all programs, approximately three-fourths (n=40, 75.5%) were taught by a family and consumer science agent and nearly half were taught by a registered dietitian (RD) (n=25, 47.2%). Sixteen (16) programs (30.2%) were taught by a certified or licensed diabetes educator (CDE/LDE), followed closely by college level nutrition educator (n=13, 24.5%) and registered nurse (RN) (n=10, 18.9%). Only one program was taught using an endocrinologist (1.9%).

Table 4.5 Program Teachers		
	All Programs	
	Number of Programs (n)	Percent of Programs (N=53)
Family and consumer science agent	40	75.47%
Registered Dietitian (RD)	25	47.17%
Certified Diabetes Educator (CDE) or Licensed Diabetes Educator (LDE)	16	30.19%
College level nutrition educator	13	24.53%
Registered Nurse (RN)	10	18.87%
Endocrinologist	1	1.89%

Participants used the "Other" text box to provide additional people who teach or have taught their programs. Although out of context of the question, Master's degree was the most listed (n=3), followed by health educator (n=2). Other responses included lifestyle coach (n=1), nutrition and food safety extension educator (n=1), paraprofessionals (n=1), pharmacist (n=1), podiatrist (n=1), trained lay leaders (n=1), "team taught" (n=1), and "med[ical] students" (n=1).

As a follow up to this question, participants were given the opportunity to list the credentials of the people who teach or have taught their programs. Content analysis was used to analyze the responses. The most commonly listed credentials were categorized into four main categories, healthcare professionals, master's degrees, bachelor's degrees and doctoral degrees. Most of the credentials listed fell under the healthcare professionals category and included registered dietitian (RD), certified diabetes educator (CDE), registered nurse (RN) and licensed medical nutrition therapist (LMNT). Master's

degrees listed included public health, nutrition, family and consumer sciences, and education. The bachelor's degree category included child and family studies, family and consumer sciences, and nutrition. Doctoral degrees listed included nutrition and pharmacy. Additional responses listed that did not fit into categories consisted of extension educator, family and consumer science agent and health educator. One participant stated, "minimum of high school degree and specialized trainings for program delivery are required." Similarly, another participant stated "specific training for diabetes education," and another responded that the teacher "varies by county."

Participants were asked which Preventative Care Practices are addressed in their diabetes education programs. A list of possible options was provided and the option was given to "select all that apply" as well as an option to list additional information under "other". When analyzing by all programs, self-monitoring of blood glucose (n=40, 75.5%), seeing a health professional for diabetes (n=40, 75.5%) and A1C tests (n=40, 75.5%) were equally the three most addressed Preventative Care Practices. In contrast, Influenza vaccinations (n=17, 32.1%) and Pneumococcal vaccinations (n=15, 28.3%) were the least addressed Preventative Care Practices among all programs. Six (6) programs (11.3%) covered none of the options provided. See Table 8.

Similarly, when analyzing by number of programs offered, the three most common Preventative Care Practices addressed among universities offering one, two or three programs, were *seeing a health professional for diabetes, self-monitoring of blood glucose,* and *A1C tests.* Likewise, *Influenza vaccination* and *Pneumococcal vaccination* were the least addressed Preventative Care Practices, followed by those offering *none*, whether universities offered one two or three programs. See Table 8.

Table 4.6 Preventative Care Practices Addressed in Diabetes Education Programs								
	Universities offering One Program		Universities offering 2 Programs		Universities offering 3 Programs		All Programs	
	Number of Programs (n)	Percent of Programs (N=15)	Number of Programs (n)	Percent of Programs (N=20)	Number of Programs (n)	Percent of Programs (N=18)	Number of Programs (n)	Percent of Programs (N=53)
Eye exams	8	53.33%	10	50.00%	10	55.56%	28	52.83%
Self-monitoring of blood glucose	11	73.33%	15	75.00%	14	77.78%	40	75.47%
Foot exam by doctor	8	53.33%	11	55.00%	10	55.56%	29	54.72%
Seeing a health professional for diabetes	12	80.00%	13	65.00%	15	83.33%	40	75.47%
Self exam of feet	5	33.33%	9	45.00%	11	61.11%	25	47.17%
A1C tests	12	80.00%	14	70.00%	14	77.78%	40	75.47%
Influenza vaccination	2	13.33%	7	35.00%	8	44.44%	17	32.08%
Pneumococcal vaccination	1	6.67%	6	30.00%	8	44.44%	15	28.30%
None	1	6.67%	3	15.00%	2	11.11%	6	11.32%

Participants used the "Other" text box to provide additional Preventative Care Practices addressed in their programs. A variety of responses were listed and included topics such as blood pressure (n=3), cholesterol (n=1) and heart disease (n=1) and microalbumin (n=1). One participant listed that "[the] importance of all [of] these practices are touched upon, but [the] main focus is pursuing this care under the guidance of health care professionals," while another listed the "all areas of weight control including behavior modification."

Participants were asked to identify Mental Health and Disability issues that they address in their programs. A list of possible options was provided and the option was given to "select all that apply". When examining all programs together, *general health* (n=43,m 87.8%) far surpassed the others as the most commonly addressed Mental Health and Disability issue. The second most addressed issue was *poor mental and physical health* (n=19, 38.8%) followed by *inability to do usual activities* (n=17, 34.7%). Thirteen (13) programs (26.5%) addressed just *poor physical health, six (6) programs (12.2%)* indicated that they addressed *none* of the topics provided and three (3) programs (6.1%) addressed just *poor physical health.*

Results were similar when analyzing by number of programs offered. Universities offering one and three diabetes education programs addressed *general health, poor mental and physical health* and *inability to do usual activities* most often. Those offering two programs addressed *general health, poor physical health* and *inability to do usual activities* the most. Furthermore, all universities, whether offering one, two or three programs addressed just *poor mental health* the least of all topics provided. See Table 9.

Table 4.7 Mental Health and Disability Issues Addressed in Diabetes Education Programs								
	Universities offering One Program		Universities offering 2 Programs		Universities offering 3 Programs		All Programs	
	Number of Programs (n)	Percent of Programs (N=16)	Number of Programs (n)	Percent of Programs (N=18)	Number of Programs (n)	Percent of Programs (N=18)	Number of Programs (n)	Percent of Programs (N=49)
Poor mental health	0	0.00%	1	5.56%	2	11.11%	3	6.12%
Poor physical health	2	12.50%	8	44.44%	3	16.67%	13	26.53%
Poor mental and physical health	6	37.50%	3	16.67%	10	55.56%	19	38.78%
Inability to do usual activities	3	18.75%	4	22.22%	10	55.56%	17	34.69%
General health	13	81.25%	16	88.89%	14	77.78%	43	87.76%
None	3	18.75%	0	0.00%	3	16.67%	6	12.24%

Participants were asked how they recruit participants through Cooperative Extension. A list of possible options was provided and the option was given to "select all that apply", as well as an option to list additional information under "other". When examining all programs together, *health professionals* (n=35, 81.4%) was the most common recruitment method, followed by *health department* (n=26, 60.5%). *Health fair screenings* (n=23, 52.5%) and *clinics* (n=23, 53.5%) were used by just over half of the programs, despite being the least common recruitment method used. Participants used the "Other" text box to provide more specific answers. The most frequented recruitment methods listed in this section were various forms of advertising including newspaper (n=5), flyers (n=4), media (n=4), as well as email blasts (n=1), news and press releases (n=1) and mail (n=1). Several programs used word of mouth (n=4) as a method of recruiting participants as well as, other community partners (n=5). Additional responses included recruiting participants via church groups (n=3), CES office (n=2), libraries (n=2), senior centers (n=1), community health coalitions (n=1) and medical offices (n=1).

In addition to being asked about the recruitment methods of their programs, participants were also asked how their programs were marketed. A list of possible options was provided and the option was given to "select all that apply", as well as an option to list additional information under "other". When analyzing all programs together, *newspaper* (n=54, 88.5%) was the most selected marketing tool, followed by *newsletter* (n=47, 77.1%). Forty-one (41) programs (67.21%) used *social media,* 39 programs (63.9%) market using a *press release* and 32 programs (52.5%) use the *radio*. *Internet sources* (n=26, 42.6%) was the least indicated marketing tool among diabetes education programs.

Participants used the "Other" text box to provide more specific answers. Several participants indicated using *participant referrals* (n=6)*, brochures* (n=5), *word of mouth* (n=4), *posters* (n=3)*, classroom* (n=3)*, flyers* (n=3) *and program partners* (n=3) to market their programs.

Program evaluation. Participants were then asked how they measure the outcomes of their programs. A list of possible options was provided and the option was given to "select all that apply" as well as an option to list additional information under "other". When examining all programs together, nearly all programs used a *questionnaire/survey* (n=49, 94.2%) to measure outcomes, while only six (6) programs (11.5%) used a checklist and two (2) programs (3.9%) used focus groups. Participants used the "Other" text box to provide more specific answers. Some programs used A1C testing (n=5) and weight loss or body weight (n=5) as outcome measurements. Other programs used blood pressure (n=3) or physical activity minutes (n=2). Additional outcome measurements listed included attendance (n=1), clinical outcomes (n=1) and an individual lesson questionnaire (n=1). One participant stated an outcome measurement of "pre-post behavioral questionnaire and 24-hour food recalls," and another listed "stories from participants

Objective 3: To identify partners involved in diabetes self-management programs offered through CES.

Participants were asked if they partner with other organizations or health care facilities to offer or teach their programs. When examining all programs together, participants indicated *yes* for 46 programs (83.6%) and *no* for only nine (9) programs (16.4%). Participants were then asked if they have funding, other than CES, for their

programs. Thirty-four (34) programs (n=61.8%) did not receive funding outside of CES, while 21 (38.2%) did. Three (3) programs (60%) indicated receiving funding from the United States Department of Agriculture (USDA) and two (2) programs (40%) indicated receiving funding from the Centers for Disease Control and Prevention (CDC). Due to an error in the survey, participants were unable to provide additional information in the "Other" text box for this question.

Next, participants were asked if they have a Diabetes Advisory Board. Twenty-five (25) participants (75.8%) answered *no,* while only eight (8) participants (24.2%) answered *yes.* Participants were then asked if they were involved in Diabetes Coalitions in their state and over half (n=19, 57.6%) answered *yes,* and 14 (42.4%) answered *no.*

Objective 4: To determine the impact of CES in diabetes self-management programs.

Participants were asked to if they had published on the effectiveness of their programs. Of the those answering this question, only seven (7) participants (21.2%) indicated that they had published on the effectiveness of their program, while 26 (78.8%) had not.

In order to gain additional perspective, the final two questions of the survey asked participants about their own experience and perspectives. Content analysis was used to analyze the responses. Participants were asked what challenges they have encountered with their programs. Across all programs, three main challenges emerged: (1) participation and attrition; (2) recruiting participants; (3) funding. Factors contributing to participation and attrition of programs listed included duration of program, and programs in rural areas. For example, one participant expressed that "Rural areas are a challenge . .

. especially if a rural hospital [and/or] area health department is already offering the program. The fact that it lasts nearly 10 months is also a deterrent for getting people to commit." Another stated that "people do not like attending 2 hours sessions for 6 weeks…it's too long. So I have a hard time getting a lot of participation," while another expressed that "obtaining audiences of significant numbers consistently" is a challenge. Some of the recruitment challenges expressed by participants were also due to the duration of the programs and included " . . . finding participants . . . for the program which involves an initial 16 week commitment." One participant stated a challenge of, "continuing to get enough people registered in the program since we teach it twice a year," and another revealed that their program failed due to "poor recruitment strategies and was only offered to those with diagnosed diabetes." Funding was the third challenge. Most participants mentioned funding in relation to the implementation of programs. One participant expressed the need for "funding for food demonstrations of My Plate diabetic friendly recipes."

Lastly, participants were asked to describe the direction that they would like to see Cooperative Extension move in the area of diabetes self-management education. Across all programs, several themes emerged in the areas of funding, reaching diverse or underserved populations, developing a consistent national diabetes program, increasing partnerships and collaboration, provide better training, improving technology and more evidence-based programs. Some examples responses under funding and reaching diverse or underserved populations include the desire to "continue to offer diabetes self-management education with partnerships that would enable participants to participate with no fee. Possibly a national commitment from insurance companies to reimburse

member/fund members who participate." Another participant stated that "we need to be thinking about how to provide this service to the un-and/or under-insured and make culturally appropriate programming, " while another said that "[they] would like to see funding for food supplies and free participant A1C testing." Responses related to developing a consistent, national diabetes program include "consistent curriculum adopted across states," and "National program that County Extension Educators can teach without liability issues." One example of direction in the area of increasing partnerships and collaboration includes "I think that we can plan an important role, especially as a partner with health professionals." A few participants expressed a desire for Cooperative Extension to provide better training. For example, one participant said "more education on diabetes to the FCS agents", and another said "more training for extension educators." In the area of improving the use of technology, one participant said " . . . finding ways to use technology to reach untapped audiences." Similarly, another participant said "We need updates on a regular base electronic newsletter and or beautiful social media materials to send out to a listserv." Other participants simply stated that programs need to have an "evidence-base".

Chapter Five

Discussion

The purpose of this study was to assess the role of Cooperative Extension in diabetes self-management education. By surveying Food, Nutrition and Extension Specialists and members of the Diabetes Community of Practice about the details of their diabetes education programs, we may be able to begin to fill the gap in research and better examine the impact of Cooperative Extension in diabetes self-management education.

Objective 1: To Determine the Number of Diabetes Management Programs Conducted by the Cooperative Extension System (CES).

Two lists were used to identify participants, the United States Department of Agriculture (USDA) Food, Nutrition and Affiliated Areas State Extension Directory and the eXtension Diabetes Community of Practice group. Obviously, there were duplication on the list and more than one person from a University was identified.

A total of 115 individuals responding to the survey indicated that their universities offered a diabetes self-management program. Forty-three indicated that they were the person responsible for working with diabetes education programming. A total of 43 Universities were included in our final sample.

Our results showed that CES is offering diabetes education in at least 29 different states. Several of these states had more than one university offering diabetes education programs, and many universities offered more than one program. Our survey reflected information regarding a total of 73 programs offered by CES.

Over half of the participants responding to the survey were from the South or what is referred to as the "diabetes belt. " This is a geographic area of the United States consisting of 644 counties and 15 mostly southern states. Residents of this area are more likely to be non-Hispanic African-American, lead a sedentary lifestyle, and be more obese, than in the rest of the U.S. (Barker, Kirtland, Gregg & Thompson, 2011). In other words, residents in this area have a much higher risk of developing type 2 diabetes, than people who live in other parts of the country. At least 11 percent of residents in these counties have diagnosed diabetes. Wahowiak (2013) mentioned that the diabetes belt presents unique challenges in the area of diabetes education and suggested that overcoming these challenges would require action on personal, neighborhood, and national levels. In addition, diabetes programming needs to be local at the community level in order to be effective (Wahowiak, 2013). Universities in the "diabetes belt" therefore have to recognize the extent of the problem in these areas and work to educate those with type 2 diabetes and those at risk for the disease in order to reduce the high incidence of diabetes in the area.

Objective 2: To examine how a diabetes self-management program is developed, implemented and evaluated.

Program planning is an ongoing, multi-step process. It is deciding what needs to be done, and who does what, when and where (Friendship-Keller, 1997). Program planning involves: identifying resources and restraints, determining objectives, designing the program, implementing the program and evaluation. Program planning is key to extension professionals' role as effective educators and it is important and valued in the CES system (Mackey, Stout, Bostwick & Wintersteen, 2008).

Program planning and development. Most of the diabetes programs offered through CES were focused on adults with type 2 diabetes and adults at risk for type 2 diabetes. CDC reported that 29.1 million adults had diabetes in 2012, and type 2 diabetes accounted for 90% to 95% of cases. Furthermore, 86 million Americans ages 20 and older had prediabetes. It seems that CES is targeted or focusing on reaching those who are most affected by the disease. The need to address type 2 diabetes is important as failure to manage the disease can lead to serious complications, resulting in high costs and loss of productivity and quality of life for many individuals. CES programs also focused on those at risk-for type 2 diabetes. The Healthy People 2020 goals mentioned that there is clear need to complement improved diabetes management strategies with efforts in primary prevention among those at risk for developing type 2 diabetes. It seems that CES is aligned with this goal as just over half of their programs were directed to adults at risk for type 2 diabetes.

The prevalence of both type 1 and type 2 diabetes among children and adolescents in the United States has increased (Dabelea et al., 2014). The number of children with type 2 diabetes has increased because of the high rate of obesity among children. However, our results showed that children with type 1 and type 2 diabetes and those at risk for developing the disease were the least targeted audiences among all CES diabetes programs. In the future CES may have to offer more diabetes education programs targeting children at risk for the type 2 diabetes. Reaching these children at an early age with prevention programs may help to curb the rising tide of type 2 among this population.

The majority of program goals were related to diabetes self-management and self-care behaviors such as healthy eating, physical activity, healthy cooking techniques, and diabetes basics. The AADE7™ Self-Care behaviors include healthy eating, being active, monitoring, taking medications, problem solving, healthy coping and reducing risks. Several of the CES program goals were aligned with many of these self-care behaviors.

The benefits of using AADE7™ Self-Care behaviors to guide the process of DSME are well known. Much of literature, containing diabetes curriculums taught by CES, such as *Dining with Diabetes*, focus on increasing knowledge of healthful food choices, portion control, and meal planning and preparation. Our results reflected this, with the most of the program goals falling under healthy eating.

However, fewer CES program goals included monitoring, taking medication, problem solving, healthy coping and reducing risks. It could be that because CES agents are not qualified or trained to provide education related to medications and other clinical issues that some of these topics were not emphasized. However, the AADE7 self-care behaviors are recommended for successful and effective diabetes self-management. This highlights the need and importance of CES partnering and collaborating with healthcare professionals who would be able to provide information in clinical areas.

Furthermore, the importance of healthy coping in the self-management of diabetes is not to be ignored, as it has been shown that people with diabetes are twice as likely as the average person to have depression (Egede, Zheng & Simpson, 2002). The fact that so few CES programs focus on reducing risks may also imply that CES need to include healthy coping as a content or topic area. People with diabetes encounter psychological distress that affects their health. It is important that CES programs provide opportunities

for their participants to talk about their problems and fears associated with managing diabetes and for CES agents and others to help them learn how to overcome obstacles and develop skills for living and coping with the diabetes.

Interestingly enough, weight loss was only mentioned twice as a goal. Research shows clearly that as little as a five percent weight loss can significantly reduce risks of developing diabetes, as well as, reduce risks in individuals with type 2 diabetes, of developing numerous co-existing conditions and complications (Diabetes Prevention Program Research Group, 2002; Wing et al., 2011). More CES programs should include a five percent weight loss goal for participants. Focusing on this goal could lead to better outcomes for participants.

Our results showed that close to half of the Universities in the survey developed their own diabetes program. Approximately 40 programs were not developed by CES. Fifteen CES institutions indicated they did not develop their own program but they use a program developed by one of the following groups – CDC, Stanford Chronic Disease Self-Management Program, and American Diabetes Association (ADA). The CDC program was used close to 60% of the time. Many participants utilized the "other" text box and indicated that they used the West Virginia Extension's Dining with Diabetes program. One University mentioned that they used the AADE program or guidelines.

Most CES diabetes self-management programs were developed using several groups of professionals. The two groups most frequently involved in CES program development were registered dietitians and FCS agents. The registered dietitian was listed as being involved in the development of the most number of programs. Other groups such as certified or licensed diabetes educators and registered nurses were also mentioned.

Only one program indicated that an endocrinologist was involved in the development of the programs. The ADA's National Standards for Diabetes Self-Management Education and Support emphasize the importance of having external input in DSME programs in order to promote program quality (Haas et al., 2014). According the ADA "external input is vital to maintaining an up-to-date, effective program." External input and discussion is important in the program planning process in that the goal is to promote ideas that will "enhance the quality of the DSME and/or DSMS being provided, while building bridges to key stakeholders" (Haas et al., 2014). Only one program utilized an endocrinologist. These professionals are specifically trained to diagnose and treat hormone imbalances and problems related to diseases and disorders of the endocrine system, such as diabetes. This group of professionals would serve as ideal partners and collaborators for CES diabetes education programming.

The most frequently mentioned length for CES programs was four weeks. This is an important area as it relates directly to recruitment, participation, and attrition of participants. Program length ranged from one to 52 weeks. The number of classes ranged from one to 24 sessions. Several Universities offered programs developed by national groups and these programs tended to be longer in duration. For example, the CDC Diabetes Prevention Program is a year long program broken into two parts. During the first six months (weeks 1-26) of the lifestyle intervention, all 16 sessions of curriculum topics must be covered. The last six months (weeks27-52) of the lifestyle intervention must include at least one session delivered in each of the six months. The Stanford Diabetes Self-Management Program is given two and a half hours once a week for six weeks. The West Virginia Extension's Dining with Diabetes program is significantly

shorter including three lessons, with each class lasting approximately 2 hours. Although evidence supports the efficacy of DSME programs as a whole, there is much variability in length of intervention and little research evaluating optimal length or duration of DSME programs (Tang, Funnell & Anderson, 2006; Brown, 1999). Therefore, the wide range in program length is both understandable and justified.

Diabetes education can be delivered in different formats. Most CES diabetes self-management programs were offered using group sessions delivered face-to-face. Hwee et al., (2014) mentioned that diabetes education through group classes led to better care and outcomes than individuals counseling with adults. They found that those in their study that attended group classes were less likely to be admitted to the emergency room and they were more likely to have adequate A1C. A review by Steinsbekk et al. (2012), showed that group based DSME was more effective than routine treatment (standard of care recommended) in improving clinical (A1C and fasting blood glucose), lifestyle (diabetes knowledge and self-management skills) and psychosocial outcomes (empowerment/self-efficacy). Our results showed that CES offered fewer programs on an individual basis. CES specializes in community outreach and influencing as many people as possible and has not historically offered individual counseling as a means of education. Therefore the low number of programs utilizing this type of delivery method was expected.

Interestingly enough, only four programs were offered online. Internet-based delivery could serve as a way to overcome multiple barriers to diabetes education including distance, limited access, scheduling logistics, and the limited supply of diabetes educators. Research shows that the idea of internet-based diabetes education has become

increasingly popular in recent years. Pereira, Phillips, Johnson and Vorderstrasse (2015), found that DSME delivered via the Internet was effective at improving measures of glycemic control and diabetes knowledge when compared with usual care. Results also demonstrated improved eating habits and increased attendance at clinic appointments. Due to the apparent benefits of online diabetes programming, it seems like in the future CES may have to consider offering more programs through this medium.

Participants were provided with the AADE7 Self-Care Behaviors (healthy eating, being active, monitoring, taking medications, problem solving, healthy coping and reducing risks) and were asked to identified which of these topics were included in their programs. Overall, most programs (98%) covered the self-care behaviors of *healthy eating* and *being active* (89%). It is important to note that when participants were asked about the goals for their programs very few goals included *monitoring, taking medication, problem solving, healthy coping* and *reducing risks*. However, it was indicated that all of these topics were covered by a many of the programs offered by CES. *Reducing risks* (80%), *healthy coping* (70%), *problem solving* (70%) and *monitoring* (69%) were covered by more than half of the programs, while *taking medication* (48%) was covered by just under half of CES programs. These topics were covered to a lesser extent but they were all selected as topics offered through CES diabetes education programs. It might be that goals need to be stated more clearly so that they are aligned to the topics being covered, preferably the AADE7™ Self-Care Behaviors, in CES programs. In that way, it would be easier to evaluate these outcomes.

Program implementation. Research shows that, historically, diabetes education has been provided by nurses and dietitians (Martin & Lipman, 2013b). Approximately

three-fourths (n=40, 75.5%) of all CES programs were taught by a family and consumer science agent and nearly half were taught by a registered dietitian (RD) (n=25, 47.2%). Sixteen (16) programs (30.2%) were taught by a certified or licensed diabetes educator (CDE/LDE), followed closely by college level nutrition educator (n=13, 24.5%) and registered nurse (RN) (n=10, 18.9%). Only one program was taught was an endocrinologist (1.9%). Furthermore, participants mentioned that programs were taught by a person with a health care professional credential such as registered dietitian (RD), certified diabetes educator (CDE) and registered nurse (RN)) and most people teaching CES diabetes programs had a Master's degree in various areas including public health education, nutrition/dietetics and family and consumer science. Because a FCS agent teaches most programs it is easy to see why medication and other clinical topics are not covered in CES programs. Also, why healthy eating and cooking techniques took precedence. Again, this emphasized the need for CES to partner with health care professional to implement diabetes self-management program. The multi-dimensional approach seems most suited for CES programming in diabetes self-management. This approach "recognizes the key role of the higher level educator as well as the importance and contributions of lay health and community workers who are uniquely positioned to collaborate with diabetes educators and other healthcare providers to improve the quality of diabetes care in communities" (AADE, 2009). The National Standards for DSME/S (2014) have recognized that health educators, case managers, lay health and community workers and peer counselors or educators can be effectively integrated into the collaborative framework of DSME. The guidelines emphasize that a system must be in place that ensures supervision of the services they provide by a diabetes educator or other

health care professional to address clinical problems or questions beyond their training. This approach seems tenable for CES as they move forward in the area of diabetes self-management.

Program Evaluation. Self-monitoring of blood glucose (n=40, 75.5%), seeing a health professional for diabetes (n=40, 75.5%) and regular A1C tests (n=40, 75.5%) were the three most preventative care practices addressed in CES diabetes self-management programs. Few programs included preventative care practices related to influenza vaccinations (n=17, 32.1%) and pneumococcal vaccinations (n=15, 28.3%). Six (6) programs (11.3%) covered none of the preventative care practices. Persons with diabetes are at increased risk for serious health complications. Preventative care practices have been shown to be effective in reducing both the incidence and progression of diabetes related complications (CDC, 2014). Addressing or mentioning these practices to participants is extremely important in order to reduce the enormous emotional, physical and financial burden that diabetes and its related complications have on the individual, the family, and the healthcare system.

The preventative care practices are part of national surveillance data collected by the CDC. The most recent data (2010) showed that 62.8% of adults (18 and older) with diabetes in 46 states reported receiving a dilated-eye examination with the last year, 63.6% reported self-monitoring their blood glucose at least once per day, 67.5% reported receiving a foot examination within the last year, 84.9% reported seeing a doctor in the last year for their diabetes, 61.1% reported examining their feet on a daily basis, 68.5 % reported having their A1C tested at least twice in the past year, and 57.4% reported ever having attended a diabetes self-management class. Among adults with diabetes in 50

states, the District of Columbia and Puerto Rico, 50.1% reported receiving an influenza vaccination within the last year and 42.5% reported ever receiving a pneumococcal vaccine. Based on this data, the Healthy People 2020 objectives include increasing the proportion of persons with diabetes follow these practices (HHS, 2010).

Our results indicated that most of the preventative care practices were covered by nearly half of the CES programs in this survey, it is concerning that so few addressed influenza and pneumococcal vaccinations and even more so that six programs indicated covering none of the preventative care practices. The importance of these vaccinations may be overlooked in CES programs. Patients with diabetes may have abnormalities in immune function and many studies support the fact that vaccination against influenza has been effective in reducing hospital admissions during influenza epidemics. Furthermore, many studies have shown that the pneumococcal vaccine is effective in reducing life-threatening bacteremic disease (Smith & Poland, 2004). It is important for CES programs to include and address these practices so that we can better show CES impact in this area. Addressing these topics could be as simple as providing a checklist of the practices so that participants could indicate that they have been accomplished .

Participants were asked to identify mental health and disability issues that they address in their programs. These included *general health, poor mental health, poor physical health, poor mental and physical health,* and *inability to do usual activities. General health* (n=43, 87.8%) far surpassed the others as the most commonly addressed mental health and disability issue. The second most addressed issue was *poor mental and physical health* (n=19, 38.8%) followed by *inability to do usual activities* (n=17, 34.7%). Six programs indicated addressing none of the mental health and disability issues. With

the exception of the *general health* category, less than half of diabetes education programs offered through CES addressed mental health issues. Mental health issues related to diabetes have the potential to compromise self-management and increase the risk for serious complications, and when undiagnosed, can cause substantial financial costs to society and healthcare systems. Individuals living with type 1 or type 2 diabetes are at increased risk for depression, anxiety, and eating disorders diagnoses. Despite this evidence, mental health issues related to diabetes are often overlooked as only one-third of patients with these co-existing conditions receive diagnosis and treatment (Ducat, Philipson & Anderson, 2014). CES has the benefit of reaching underserved populations specifically those in rural areas. Research has shown that depression rates in some rural areas significantly exceed those in urban areas (Probst, Laditka, Moore, Harun & Powell, 2005). The opportunity exists for CES to address mental health issues in diabetes education programs in order to help raise awareness throughout the community.

CES programs predominantly used a questionnaire or survey (94%) as a tool for measuring the outcomes of their programs, while very few used a checklist or focus groups. This is not surprising as it is easier to collect evaluation data and measure the achievement of objectives through a questionnaire.

Participants for diabetes education programs offered through CES were recruited using a variety of methods. Recruitment through health professionals (81%) was the most commonly used method. Over half of the programs also recruited participants through the health department, health fair screenings and clinics. Participants utilizing the "Other" text box indicated the use of newspapers, flyers, media, word of mouth, other community partners and church groups. The recruitment and attrition of participants in

community programs has been identified as a common barrier to the implementation of successful programs. There is little research related to the most effective recruitment strategies for community-based programs. Therefore, the wide range of methods listed is understandable. McCann, Ridgers, Carver, Lukar and Teychenne (2013) identified effective recruitment strategies in community health programs such as word of mouth, links with organizations, dissemination of printed materials, media, referrals, cross-promotion of programs and face-to-face methods. It may be important for CES programs to report on the effectiveness of their recruitment and retention successes and failures in order to provide insights for future programs.

Our results showed that CES programs used a wide range of marketing materials for their programs. Printed materials such as newspapers (89%) and newsletters (77%) as well as social media (67%) were the most commonly for used for CES diabetes education programs. Many programs also used press releases and the radio. Surprisingly, Internet sources (43%), such as websites, were the least used of the marketing tools marketing tool. Much like recruiting, successful marketing is an essential component to the implementation of a community diabetes education program. Marketing strategies should be tailored to address the target audience's needs, grab attention, inspire interest, and move your target audience to act (NDEP, 2008). The use of social marketing is a key concept in public health. Social marketing is defined as "the application of commercial marketing technologies to the analysis, planning, execution, and evaluation of programs designed to influence the voluntary behavior of target audiences in order to improve their personal welfare and that of their society." (Thackeray & Neiger, 2003; Andreasen, 1995). The social marketing process includes key concepts that involve preliminary

planning, formative research, development, implementation and evaluation. Thackeray and Neiger (2003) showed that the application of the key steps of social marketing can facilitate the development of culturally innovative diabetes interventions.

Objective 3: To identify partners involved in diabetes self-management programs offered through CES.

As previously discussed, CES partnerships and collaborations with other organizations and healthcare facilities and professionals is vital to the delivery of successful diabetes self-management education. Our results revealed that 84% of CES programs partnered with other organizations or healthcare facilities to teach their diabetes education programs. Over half of the diabetes education programs offered received funding from within CES, while others received outside funding from National sources such as the USDA and CDC. Seventy-six (76) percent of the universities indicated that they did not have a diabetes advisory board. The percentage of participants involved in diabetes coalitions within their state was almost evenly split.

Objective 4: To determine the impact of CES in diabetes self-management programs

Over 75% of universities indicated that they have not published on the effectiveness of their programs. Our review of literature revealed that there is little research regarding the success of CES in offering diabetes education programs outside of areas pertaining to healthy lifestyle, eating and cooking practices. It is important for CES to offer programs that are evidence based and that have shown to be effective in order to make an impact on the communities they serve. There is need for more research pertaining to CES as the source for diabetes self-management education.

The challenges or barriers that universities faced when offering diabetes education programs through CES related to participant recruitment, attrition and funding for their programs. Our results are not surprising**,** as most of the barriers to program implementation in the literature reveal similar themes. Balamurugan, Rivera, Jack, Allen and Morris (1998) identified several programs and patient levels such as staffing and reimbursement as well as transportation. They also found that participant retention posed a challenge partly as a result of environmental factors associated with rural health settings. Gucciardi, Demelo, Offenheim and Stewart (2008) examined factors that may contribute to attrition behaviors in diabetes self-management programs. Among these barriers, time conflicts and constraints as well as distance from the center were frequently listed. It is important to note that over half of the programs in this survey were funded by CES and funding was a major challenge listed by participants. Perhaps universities should seek other sources of funding such as grants from national and private organizations.

A variety of suggestions were given regarding the direction that CES should move in the area of diabetes self-management education. Again, funding was at the forefront, with several universities expressing the need for insurance coverage and reimbursement. Another interesting finding is that several universities expressed the desire or need for a developing a consistent, national diabetes program to be used by CES. Despite the widespread use of programs such as Dining with Diabetes, very few CES programs focused on all of the core concepts of diabetes self-management. Having a consistent curriculum or set of guidelines across all states could help to decrease factors such as

variability in length of interventions and program goals and outcomes and also to ensure programs are evidence based and effective.

Conclusion

The purpose of this study was to assess the role of Cooperative Extension in diabetes self-management education. The need to combat the rising prevalence of diabetes now more than ever is a nationwide issue. Furthermore, the need for interventions to be at the community level makes CES a unique organization for partnering with other health care and health care providing organizations to offer diabetes self-management education. The results of this study can be used to provide insight into what is being done by CES in the area of diabetes self-management education and to assist CES professionals in the future development and implementation of their programs.

In terms of diabetes self-management education, CES has a wide reach. CES diabetes self-management programs were offered in over half of U.S. Most programs offered through CES focused on adults with type 2 diabetes and adults at risk for type 2 diabetes. Very few programs targeted children with diabetes or at risk for developing type 2 diabetes. In the future CES DSME programs would need to target children who are at-risk for diabetes in an attempt to curb the increasing incidence of type 2 diabetes among children.

Most CES DSME programs were focused on diabetes self-management and the AADE 7 self-care behaviors related to healthy eating and physical activity. Fewer individuals indicated that their programs goals focused on monitoring, taking medication, problem solving, healthy coping and reducing risks. These goals should be included in CES programming as they reflect the AADE7 Self-care behaviors. Partnering with a

health care professional or organizations could allow CES to teach topics related to medication and other clinical areas.

There was some dissonance in the area of the goals identified and topics offered in CES diabetes education programs. Many programs did not have many of the AADE7 self-care behaviors as a goal but most stated that many of the self-care behaviors were covered as topics during their programs. Those involved in developing the program need to be sure that program goals and outcomes are a direct reflection of topics being covered in classes. The benefits of using the AADE7 Self-Care Behaviors as a framework and to measure outcomes are well known; therefore, CES should use this framework to guide the development of goals and topics.

CES incorporates a wide range of partners in diabetes self-management education programs. Most of CES programs were developed and taught mainly by registered dietitians and family and consumer science agents. Other partners included certified or licensed diabetes educators, registered nurses, and one program used an endocrinologist. Incorporating a wider range of healthcare professionals in this process could be an important solution to providing programs through CES that address more of the clinical, preventative care practices and mental health topics that our results showed to be getting overlooked.

Some of the challenges in diabetes education programming included recruitment and attrition of participants as well as obtaining adequate funding for programs. CES should continue to be innovative and tailor their programs to the individuals and communities they are serving. Tailoring diabetes education programs and its messages for a specific culture or community means doing more than providing services in the

proper language. Strategies should change according to ethnic group, geographical location, immigration status, rages of residents, and environment of the community. Few CES programs were offered online. In the future CES may have to consider the online form for programming as this could be a solution to many of the recruitment and attrition problems. In the same way, utilizing current technology and resources to market and recruit participants for programs may benefit the marketing and recruitment process. The success of a program relies on more than just the participants themselves. Determining the appropriate recruitment and marketing strategies can help to improve the attendance and attrition of programs. The National Diabetes Education Program (NDEP) recommend assessing your organizations stage of change in order to set more realistic objectives for developing effective programs and services (NIH, 2008). Lack of funding was identified as a serious barrier to program development and implementation. CES may have to look to external and internal funding sources in order to help cover program costs. There are several funding options available to provide financial support of community-based programs such as grants, contracts, public funds, private funds, in-kind support, and fundraising events and activities (NIH, 2008; Aspen Reference Group, 1997). CES should identify financial resources prior to implementing programs and follow up with all sources throughout in order to maintain those funds.

In terms of the future direction of CES in DSME, most suggestions were related to receiving more funding for program development and implementation, and for participants to receive insurance coverage. Participants also suggested the need for a national or consistent program or set of guidelines designed specifically for use by CES. There was great variability in programs related to content, length, goals, and outcomes.

In order to CES to be effective in providing DSME in the future, these challenges and concerns must be addressed. Publishing on the results of programs as well as marketing and recruitment strategies, sources of funding, outcomes and goals can help to provide insight into the successes and failures, and help CES continue to move towards offering more effective and successful DSME.

Implications

The results of this study can be used to provide insight into what is being done by CES in the area of diabetes self-management education and to assist CES professionals in the future development and implementation of their programs. Future studies should work to obtain a more inclusive sample. It would be helpful to have a national list of all CES institutions offering diabetes programming and the person responsible for this programming.

Appendix A: Qualtrics Survey

Cooperative Extension's Role and Impact in Diabetes Self-Management Education (DSME) Survey

1. Does your university offer diabetes programming through the Cooperative Extension Service? (If no, sent out of survey)
    a. Yes
    b. No
    c.
2. Are you the person responsible for working with diabetes programming? If no, sent out of survey)
    a. Yes
    b. No
    c.
3. In what state or affiliated area do you offer diabetes education programs?

4. Do you offer more than one diabetes education program?
    a. Yes
    b. No

5. Please enter the names of the diabetes program you offer.

6. Who is your primary target audience?
    a. Adults with type 2 diabetes
    b. Adults with type 1 diabetes
    c. Adults at risk for type 2 diabetes
    d. Children with type 2 diabetes
    e. Children with type 1 diabetes
    f. Children at risk for type 2 diabetes
    g. other

7. What are the goals of your diabetes education program?

8. Did your organization develop your program?

9. Do you use a program developed by a national group?
    a. CDC
    b. Chronic disease self management program
    c. ADA
    d. Other

10. Who were the people groups involved in developing your program?
    a. CDE/LDE
    b. RD
    c. Endocrinologist
    d. College level nutrition educator
    e. Family and consumer science agent
    f. RN
    g. Other

11. What is the length of the program?

12. How is your program delivered?
    a. Individual sessions
    b. Group sessions
    c. Online
    d. Face to face
    e. Other

13. Who currently teaches the program or has taught the program in the past?
    a. CDE/LDE
    b. RD
    c. Endocrinologist
    d. College level nutrition educator
    e. Family and consumer science agent
    f. RN
    g. Other

14. List the present credentials of the people who teach the program

15. Which of the following topics are included in your educational program?
    a. Healthy eating
    b. Being active
    c. Monitoring
    d. Taking medication
    e. Problem solving
    f. Reducing risks
    g. Healthy coping
    h. Other

16. Which of the following preventative care practices do you address in your program?
    a. Eye exams
    b. Self monitoring of blood glucose
    c. Foot exam by doctor
    d. Seeing a health professional for diabetes
    e. Self exam of feet
    f. A1C tests
    g. Influenza vaccination
    h. Pneumococcal vaccination
    i. None
    j. Other

17. Which of the following mental health and disability issues do you address?
    a. Poor mental health
    b. Poor physical health
    c. Inability to do usual activities
    d. General health
    e. None
    f. Other

18. How do you measure the outcomes of your program?
    a. Questionnaire/survey
    b. Checklist
    c. Focus group
    d. Other

19. How do you recruit participants through cooperative extension?
    a. Health professional referrals
    b. Health department
    c. Health fair screening
    d. Clinics
    e. Other

20. How is your program marketed?
    a. Newspaper
    b. Radio
    c. Social media
    d. Internet sources
    e. Press release
    f. Newsletter
    g. Other

21. Do you partner with other organizations or health care facilities to offer or teach the program?
    a. Yes
    b. No

22. Do you have funding other than CES?
    a. Yes
    b. No

23. Who are the funders?
    a. CDC
    b. NIH
    c. USDA
    d. Other
24. Do you have a diabetes advisory board?
    a. Yes
    b. No

25. Are you involved in diabetes coalitions in your state?
    a. Yes
    b. No

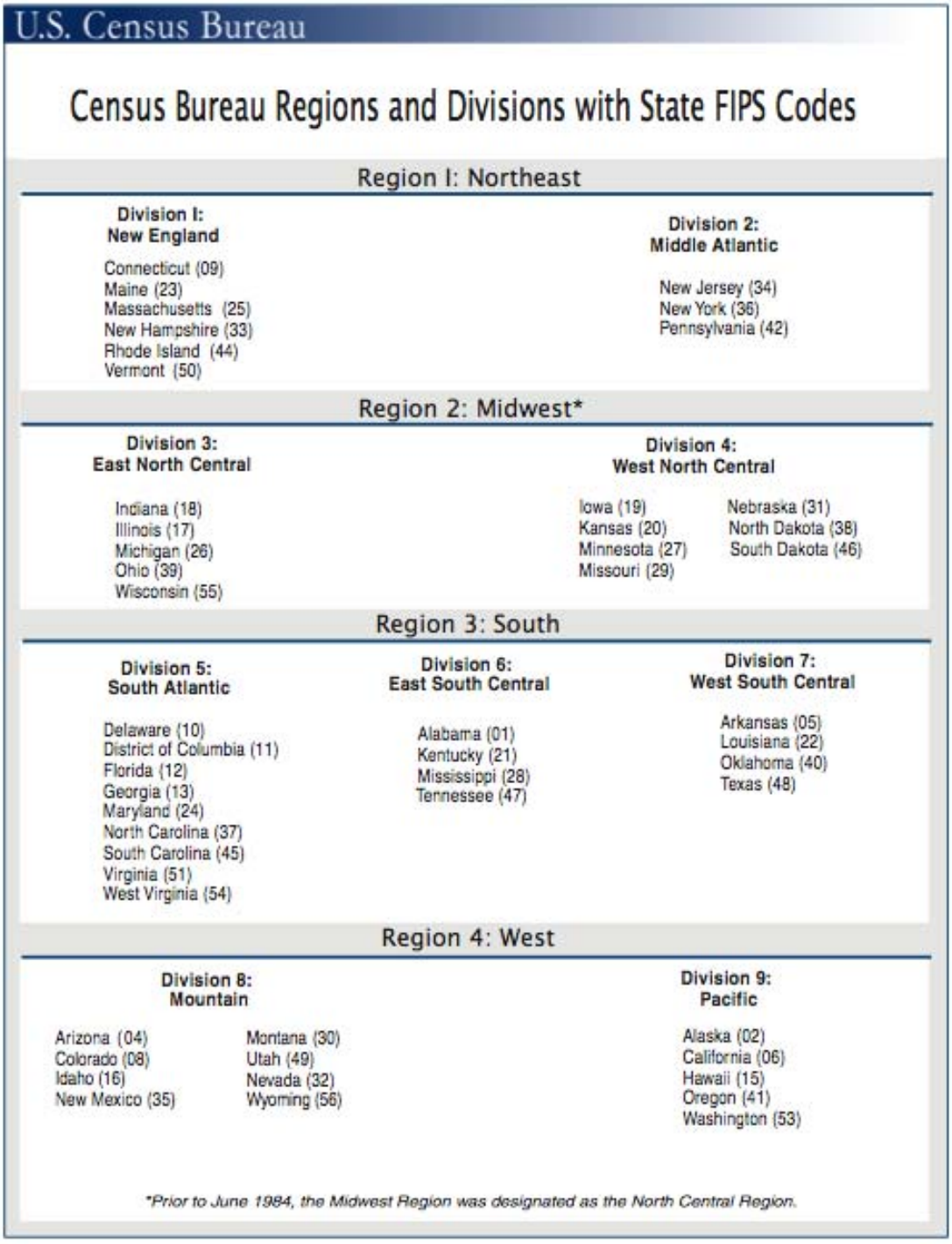
26. Have you published on the effectiveness of the programs?
    a. Yes
    b. No

27. What challenges have you encountered with your programs?

28. What direction would you like to see CES move in the area of diabetes self-management education?

Appendix B: U.S. Census Bureau Regions and Divisions of the United States

http://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf



U.S. Census Bureau

Census Bureau Regions and Divisions with State FIPS Codes

Region 1: Northeast

Division 1: New England

Connecticut (09)
Maine (23)
Massachusetts (25)
New Hampshire (33)
Rhode Island (44)
Vermont (50)

Division 2: Middle Atlantic

New Jersey (34)
New York (36)
Pennsylvania (42)

Region 2: Midwest*

Division 3: East North Central

Indiana (18)
Illinois (17)
Michigan (26)
Ohio (39)
Wisconsin (55)

Division 4: West North Central

Iowa (19)
Kansas (20)
Minnesota (27)
Missouri (29)
Nebraska (31)
North Dakota (38)
South Dakota (46)

Region 3: South

Division 5: South Atlantic

Delaware (10)
District of Columbia (11)
Florida (12)
Georgia (13)
Maryland (24)
North Carolina (37)
South Carolina (45)
Virginia (51)
West Virginia (54)

Division 6: East South Central

Alabama (01)
Kentucky (21)
Mississippi (28)
Tennessee (47)

Division 7: West South Central

Arkansas (05)
Louisiana (22)
Oklahoma (40)
Texas (48)

Region 4: West

Division 8: Mountain

Arizona (04)
Colorado (08)
Idaho (16)
New Mexico (35)
Montana (30)
Utah (49)
Nevada (32)
Wyoming (56)

Division 9: Pacific

Alaska (02)
California (06)
Hawaii (15)
Oregon (41)
Washington (53)

**Prior to June 1984, the Midwest Region was designated as the North Central Region.*

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