Introduction (Slide #2)

- Total estimates place the number of Americans with DM at 23.6 million, roughly 7.8 percent of the nation’s population, with nearly one-quarter of individuals unaware that they have DM (CDC, 2008).

- Type 2 DM, formerly known as non-insulin-dependent diabetes mellitus, accounts for between 90 and 95 percent of cases of DM in the United States.

- About 57 million U.S. adults aged 20 years and older have pre-diabetes with elevated blood glucose levels just below the diagnostic cut-off.

- Individuals with pre-diabetes are at a greater risk for developing type 2 DM and primary prevention measures could greatly benefit this large segment of the population by either preventing or delaying a diagnosis (CDC, 2008).

- African Americans account for about 15% of the total cases of DM in the U.S. with 3.7 million individuals affected and this number of cases also accounts for 14.7% of the total African American population aged 20 years or older.

- After adjusting for population age differences among Americans aged 20 years or older, 11.8% of African Americans were diagnosed with DM compared with 6.6% of whites (CDC, 2008).

Background (Slide #3)

- In the state of Wisconsin, approximately 235,330 (5.7%) of adults are diagnosed with DM and estimates suggest that another 94,130 (2.3%) individuals are undiagnosed.

- Type 2 DM is more prevalent in African Americans than in white populations in Wisconsin.

- Among African Americans in the 18-44 years, 45-64 years and 65+ years, age groups the proportion of the population with diagnosed and undiagnosed DM is 3.9%, 20.3%, and 25.6%, respectively. The total proportions of diagnosed and undiagnosed DM cases among white populations in the 18-44, 45-64, and 65+ age groups reveals 2.1%, 10.2%, and 18.3%, respectively.

- More alarming is the number of African Americans considered to be “pre-diabetic”, or having elevated blood glucose levels that do not yet meet the threshold for diagnosis of the disease.
Based on 2002 estimates, the prevalence of pre-diabetes in Wisconsin’s African American population is approximately 40% (33,710 persons) (Wisconsin DHFS, 2005).

Background (Slide #4)

- Type 2 DM is characterized by impaired insulin secretion, insulin resistance, excessive hepatic glucose production, and abnormal fat metabolism.

- Obesity with marked visceral or central deposition of fat predisposes individuals to develop type 2 DM.

- The obesity, particularly central obesity, typically accompanies type 2 DM is thought to be part of the pathogenic process of the disease.

- Adipocyte mass is active and responsible for the release of several biologically active compounds including: circulating free fatty acids, retinol-binding protein 4, leptin, TNF-α, resistin, and adiponectin.

- These adipokines help to regulate body weight, appetite, energy expenditure and can also help adjust insulin sensitivity.

- Visceral adipose tissue produces increased proportions of certain substances like free fatty acids while producing less of other adipokines such as adiponectin. These changes result in increased insulin resistance and increase insulin requirements; ultimately resulting in development of type 2 DM.

Background (Slide #5)

- Reduction in body weight, especially the reduction of visceral adipose tissue, will halt some of these pathological processes and may prevent the development of type 2 DM (Powers, 2008).

- Other risk factors for type 2 DM include: age, family history of DM, prior history of gestational DM, impaired glucose tolerance or pre-diabetes, physical inactivity, and race/ethnicity (CDC, 2008).

- According to the CDC, in 2006 the age-adjusted rate of diabetes in African American was 8.1 per 1,000 for men and 8.8 per 1,000 for women compared with 5.5 per 1,000 for white men and 5.0 per 1,000 for white women.

- Type 2 DM has a strong genetic component that can put certain individuals at greater risk for developing the disease.
Persons with a parent diagnosed with type 2 DM are at greater risk for developing DM and this risk approaches 40 percent for those with two parents having type 2 DM.

**Purpose (Slide #6)**

- The purpose of this paper is to review current literature to determine the efficacy and relevance of public health interventions designed to prevent type 2 DM by preventing or reducing obesity through lifestyle interventions.
- Special focus will be given to assessing if interventions are effective among African American populations.
- This paper also intends to synthesize data from literature reviews to construct recommendations on the most effective and valuable interventions for the prevention of type 2 DM in a Federally Qualified Health Center, such as Westside Healthcare Association of Milwaukee (WHA).

**Methods (Slide #7)**

- The literature review began with a PubMed search for articles pertaining to type 2 DM prevention and article components were then used to evaluate the efficaciousness of interventions in preventing the development of type 2 DM.
- Literature involving African American cultural perspectives, environmental barriers, and community health centers was reviewed to consider special challenges.
- Recommendations were assembled to provide the Westside Healthcare Association with a framework for preventing type 2 DM through obesity prevention and physical activity promotion.

**Results (Slide #8)**

- Knowler et al. (2002) found a 58% reduction in incidence of type 2 DM in the lifestyle modification intervention group (95% CI: 48, 66) and a 31% reduction in the metformin group (95% CI: 17, 43) compared with placebo group.
- The incidence of type 2 DM was 11.0, 7.8, and 4.8 cases per 100 person-years of observation in the placebo, metformin, and lifestyle intervention groups, respectively (Knowler et al., 2002).
The incidence of type 2 DM found to be 39% lower in the lifestyle intervention group than in the metformin group (Knowler et al., 2002).

Results (Slide #9)

- West et al. (2008) found that women had a higher proportion of obese participants than men (74% vs. 59%, P< 0.0001).

- African Americans had a higher proportion of obese participants than Hispanics and whites (74% vs. 67% and 68%, respectively; P = 0.0076) (West et al., 2008).

- Within the lifestyle intervention group, it was also revealed that all race-gender groups lost a comparable amount of weight, except for African American females who lost significantly less weight (P< 0.01) (West et al., 2008).

Results (Slide #10)

- Krishnan et al. (2009) study examining how actual levels of physical activity among African American women were related to the incidence of type 2 DM.

- Brisk walking for 5 or more hours per week relative to 0 (zero) hours was also associated with a reduced risk of developing type 2 DM of 0.67 (95% CI: 0.49, 0.92) (Krishnan et al., 2009).

- Television watching was positively associated with the risk of type 2 DM for women watching 5 or more hours of television per day compared with less than 1 hour per day with a incidence rate ratio of 1.86 (95% CI: 1.54, 2.2.4) (Krishnan et al., 2009).

- Nwobu and Johnson’s (2007) review of childhood and adolescent obesity prevention programs highlights the need for substantial duration of the interventions to allow for adjustment to new lifestyle behaviors and consistency to reinforce new dietary and physical activity behaviors.

Results (Slide #11)

- The Dietz (2001) and Jain et al. (2001) studies found that, in general, African American adult women did not consider physicians and health professionals were not considered the most reliable source of health information and instead often deferred to maternal advice.

- Child growth charts were not viewed as appropriate indicators of height-to-weight distribution and African American mothers tended to view their child’s
weight and growth tendencies as predetermined by heredity and not greatly subject to lifestyle habits (Jain et al., 2001).

- Barriers to healthy eating included the cost of healthy foods (especially fruits and vegetables), the taste of foods, and the amount of time necessary to prepare healthy meals (Dietz, 2001).

- The amount of time and money devoted to their hair care was viewed as the biggest barrier to physical activity (Dietz, 2001).

- Among adolescents and adults of all races, the terms “overweight” and “obesity” were poorly understood (Jain et al., 2001), (Dietz, 2001), & (Young-Hyman et al., 2000).

- In general, African Americans had difficulty recognizing and defining overweight and obesity and believed these terms did not apply to themselves or family members despite clinical definitions placing them into these categories (Jain et al., 2001), (Dietz, 2001), & (Young-Hyman et al., 2000).

- African Americans tended to have greater cultural acceptance of larger body sizes, especially for females, and some misunderstanding of the contribution of lifestyle choices to obesity (Jain et al., 2001), (Dietz, 2001), & (Young-Hyman et al., 2000).

**Results (Slide #12)**

- Physical activity-related outlets were significantly less likely to be present in neighborhoods with higher proportions of African Americans residents and residents from other ethnic minorities (Powell et al., 2006).

- Wealthy neighborhoods were found to have 3 times as many supermarkets as poor neighborhoods (Morland et al., 2002).

- Supermarkets were 4 times more common in predominantly white neighborhoods compared with predominantly African American neighborhoods while small grocery stores, convenience stores, and convenience stores with gas stations were less common in predominantly white neighborhoods (Morland et al., 2002).

- Concerning type 2 DM prevention intervention in community health centers, type 2 DM risk factor assessment among providers was poor, diabetes screening tests were underutilized and documentation of behavioral counseling efforts was minimal (Rosal et al., 2008).
A majority of providers believed that “limited patient motivation,” “patient’s attitude toward dietary changes,” and “cultural differences toward prevention” were barriers to effective type 2 DM prevention (Rosal et al., 2008).

Recommendations (Slide #13)

- The most effective method of public health intervention to prevent type 2 DM in at-risk African American populations, applicable to the City of Milwaukee, is an intensive, multiple month duration lifestyle and behavioral modification program. Elements of the program should include:
  
  A. Potential participants compiled from a medical record review to include adult individuals over age 20 years having a BMI of 25 or more (overweight), an elevated fasting state and postprandial plasma glucose levels. A family history of type 2 DM could indicate potential participants as well.
  
  B. Assessment of intervention results should include standard measures such as:
     a semiannual fasting plasma glucose test, Modifiable Activity Questionnaire, and the Block food-frequency questionnaire, and height and weight measurement. Additionally, a measurable lifestyle modification program goal, such as a 5-10% weight loss goal and weekly exercise requirement should be determined.
  
  C. The program design should include a defined 15 to 20 session curriculum of educational materials on type 2 DM, nutrition, diet, exercise, and behavior modification lasting no fewer than 18 weeks, with a preferred length of 24 weeks or more. The curriculum should be delivered on an individual, personalized basis to ensure privacy and comfort for the patient and increase the likelihood of adherence to the defined program weight loss and exercise goals.
  
  D. At least one curriculum sessions should be devoted to a discussion on the impact of type 2 DM on the family, genetic aspects of the disease and the importance of early prevention in children and adolescents.
  
  E. The curriculum should be culturally appropriate with discussions on African American body image, definitions regarding body weight, and potential barriers to lifestyle changes. Patients should be encouraged to discuss what they believe are barriers to their success, economic or otherwise, and possible solutions to those barriers.
  
  F. A List of resources such as food pantries, special produce markets for low-income families (e.g. Garden of Eden, 1011 W Historic Mitchell Street,
Milwaukee) and recreational facilities should be made available to all participants.

G. Clinic management should consider a small monetary incentive for participants willing to complete the entire intervention. For example, management may consider an incentive greater than or equal to the cost of public transportation to and from the 15 to 20 educational sessions.

- Prior to initiating an intensive lifestyle intervention, WHA should conduct a systematic evaluation of patient medical record management and reminder systems to ensure that patient appointments and provider services are scheduled appropriately.

Recommendations (Slide #14)

- A provider review of the U.S. Preventive Services Task Force recommendations on type 2 DM prevention, especially considering African American populations, and a review of culturally appropriate behavioral modification counseling should be scheduled prior to the intervention start date.

- As funding may become an issue in implementing such an intervention program, WHA should seriously consider first applying for a REACH grantee partnership position.

The funds provided through the CDC would provide WHA with the means to employee one or more full-time staff members to administer the prevention program and evaluate the effectiveness of the program design.

WHA would be an ideal candidate for the REACH U.S. program as there is currently no established partnership in the state of Wisconsin, WHA is a Federally Qualified Health Center providing care to a medically underserved population, and WHA has already established several major community partnerships.