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The Quality of Diabetes Care to Gullah Families of South Carolina

Ida Johnson-Spruill, PhD, RN [Post Doctoral Fellow] and
Clinical Genetics at the University of Iowa, College of Nursing, Iowa City, IA.

Barbara Riegel, DNSc, RN, CS, FAAN [Associate Professor]
School of Nursing, University of Pennsylvania, Philadelphia, PA.

Abstract

Empirical evidence from the Diabetes Control and Complication Trial (DCCT) suggests that maintaining normal glycemic control can prevent both micro vascular and macro vascular diseases in persons diagnosed with type 2 diabetes mellitus (T2DM) (DCCT, 1993). Adults with T2DM are also more likely to have hypertension (73% [HTN]) and patients with both are 2 to 4 times more likely to develop diabetic complications compared with the general population (CDC, 2005). The purpose of this descriptive study was to 1) describe the quality of diabetes care received by Gullah families who participated in the Project SuGar research study; and 2) compare the Gullah's quality of care to the national sample in the Center for Disease Control (CDC) Diabetes Report Card using the two indicators of blood pressure and HbA1c. This was a secondary analysis from a parent study that compared selected data to the CDC Diabetes Report Card, the National Health and Nutrition Examination Survey (NHANES III), and the Behavioral Risk Factor Surveillance System (BRFSS). Socio-demographic and clinical data were obtained from 1,057 research participants (N = 1,057). Overall, when compared to the national sample in the CDC Report Card, the HbA1c greater than 9.5% mg/dL was higher among the Gullahs, (30.2% vs. 18%), and blood pressure greater140/90 mmHg was lower (29% vs. 34%) among the participants. Almost half of the Gullahs (45.9%) self-reported neurovascular complications such as foot pain, claudication, and renal complications of kidney infection and dialysis (7.3%). The Gullah study participants are at risk for diabetes-related complications. Results suggest a quality gap in diabetes care and it suggests health disparities in outcome measures as well. Optimal care that is consistent with clinical guidelines could have a significant impact on decreasing complications and health disparities.

Keywords

African-Americans; diabetes; Gullah; health disparities; rural

Introduction

Type 2 diabetes mellitus (T2DM) is a typical example of a chronic disease affecting over 21 million people, and causing considerable morbidity and mortality. It is associated with older age, obesity, family history, gestational diabetes, impaired glucose metabolism, physical inactivity, and race/ethnicity. African-Americans, Hispanic/Latino Americans, American Indians, some Asian Americans and Native Hawaiians or Pacific Islanders are at a particularly high risk for T2DM and its complications (CDC, 2005). Fortunately, several treatment strategies to prevent or to delay diabetes complications have emerged. However, implementation remains suboptimal and varied. Thus, improving diabetes care in the United

Address Requests for Reprints and Correspondence to: Ida Spruill, PhD, RN, Post Doctoral Fellow, Clinical Genetics, College of Nursing, University of Iowa, 50 Newton Road, 305 Nursing Building, Iowa City, IA 52242-1121. Email: E-mail: ispruill@yahoo.com.

States is a topic of major concern for health-care providers. According to the Centers for Disease Control and Prevention (CDC), millions of diabetic patients may not be receiving optimal care for their disease (CDC, 2002).

Review of the Literature

The CDC Diabetes Report Card

The Diabetes Report Card, a summary of the quality of diabetes care in the United States, was developed using a set of standard measures designed by the Diabetes Quality Improvement Project (DQIP) to document levels and quality of diabetes care (CDC, 2002). These standards were in response to a growing recognition of the need to deliver universally high-quality diabetes care. The DQIP measures were designed to assess the performance of health-care systems in populations, and to offer a way to make comparisons across health systems.

Results from the CDC Report Card illustrated that millions of patients with T2DM might not be receiving optimal care for their disease (CDC, 2002). The report card used data from two national sources: 1) NHANES III) 1998–1994 (N = 1,026), and 2) BRFSS (N = 3,059) to serve as a benchmark to monitor the changes in diabetes care. Both surveys used participants from 18 to 75 years of age who reported a physician's diagnosis of T2DM.

The CDC Diabetes Report Card (2002) was published in April 2002, and some selected results pertinent to this study are reported as follows:

- 18% of the national sample had poor glycemic control (HbA1c > 9.5%).
- 34% of those with diabetes had a BP > 140/90 (CDC, 2002).

The report also compared non-Hispanic Whites to non-Hispanic Blacks and documented that Blacks were more likely to have a HbA1c > 9.5% (29.9%), and were less likely to have controlled blood pressure <140/90 mmHg (66.3%). These results focused national concern on the quality of diabetes care, particularly in ethnic minorities and states where the prevalence of both diabetes and hypertension are high. In spite of these published results in 2002, studies to document diabetes care among rural isolated African-American populations was virtually non-existent.

Overall Health and the Burden of Illness

While the overall health of the United States has improved over the last two decades, there continues to be striking disparities in the burden of illness and death experienced by various racial and ethnic populations (Carter-Porkas & Baquet, 2002). With the launch of Healthy People 2010 in early 2000, the Department of Health and Human Services (DHHS) committed the nation to an overarching goal of eliminating health disparities. One major reason for these disparities appears to be a gap in the quality of care received by ethnic/racial populations.

The quality gap, as defined by the Agency for Health-care Research and Quality (AHRQ), is the difference between present treatment success rates and those thought to be achievable using best practice guidelines (AHRQ, 2005).

The Quality Gap and Racial Disparities

The quality gap remains a growing concern in states like South Carolina where the rates of both diabetes and hypertension are high. In 2006, according to Center for Disease Control and Prevention (CDC) and the Behavioral Risk Factors Surveillance System (BRFSS), 9.6% of the state population was diagnosed with Type 2 diabetes affecting 13.1% of African-Americans and 8% of Whites (CDC, BRFSS, 2006). Moreover, only thirteen states have a higher prevalence rate (> 9%) of T2DM, and nationally, South Carolina is ranked as number eight

(CDC, BRFSS, 2006). Furthermore, the prevalence of hypertension (HTM) among patients with T2DM in South Carolina is equally alarming. For example, HTN in South Carolina is 70% higher among diabetic patients compared to the general population (28.8%) (The Burden of Diabetes in South Carolina, 2003). Obesity, a contributing factor to both diabetes and HTN, was equally alarming, affecting 25.1% of the population. South Carolina exceeds the national percentages rates in T2DM, HTN, and obesity (see Table 1). Even though research that documents disparities and quality of diabetes care to ethnic minorities is scarce, the Institute of Medicine (IOM) Report on Racial Disparities found that African-Americans as a group, had lower socioeconomic status than White Americans did. They also found that all racial and ethnic minorities in the U.S. received lower quality healthcare than did Whites, regardless of their socioeconomic status, health insurance coverage, age, or presence of co-morbid conditions (IOM, 2002).

Not every study has demonstrated racial disparities in diabetes treatment. In an observational study in 21 Veterans Affairs hospitals using the Diabetes Improvement Project Survey (DQIP), Heisler (2003) reported that there were no racial differences in the receipt of HbA1c testing or foot examination. However, African-Americans (n = 115) were less likely than Whites (n = 801) to have their low-density lipid (LDL) cholesterol level checked in the past year (72% vs. 80%), or to have a dilated eye exam (50% vs. 63%), respectively. He concluded that based on DQIP standards, the quality of diabetes care for African-Americans patients with diabetes was significantly lower in only two indicators, LDL testing and dilated eye examination (Heisler, Smith, Hayward, Krein & Kerr, 2003).

Diabetes and Hypertension

Type 2 diabetes mellitus is characterized as hyper-glycemia and insulin resistance and is diagnosed with a fasting blood sugar of over 126 mg/dL on two separate occasions. Both T2DM and hypertension are common, potentially disabling chronic diseases (ADA, 2008). The increased prevalence of T2DM among African-Americans extends to children, adolescents, and military personnel on active duty. These disparities are reflected in the quality of health-care and this results in higher rates of retinopathy, microalbuminuria, end stage renal disease, lower extremity amputation, and mortality when compared with White Americans (Marshall, 2005). Similarly, in 2004, the National Center for Health Statistics (NCHS) reported that the national death rates from diabetes was 24.5%, and was highest among African-American males (51.3%) and African-American females (45.3%) vs. White males (26.2%) and White females (19.2%) (NCHS, 2004).

Similarly, the prevalence of hypertension (defined as blood pressure greater than 140/90 mmHg) is higher in African-Americans than in the general adult White population (37%) vs. (25%). Hypertension affects over 60% of people with diabetes depending on age, ethnicity, and body weight. It is the second leading cause of kidney failure among African-Americans and it remains the leading cause of death in African-Americans because of its link with heart attack and stroke (AHA, 2004). Control of hypertension is a focus of diabetes care because when combined with diabetes, diabetes-related complications are two to four times more likely to occur. However, when controlled, the risk of cardiovascular disease among persons with T2DM is decreased by 33%–50% and the risk to micro vascular complications by approximately 33% (U.S. Renal Data System, 2004; CDC, 2006). Research from the Diabetes Control and Complication Trial (DCCT) indicates that diabetes can be controlled and its related complications can be minimized with clinical care that is consistent with published guidelines (DCCT, 1993). Since the rates of both diabetes and hypertension are known to be higher among disadvantaged populations, this study sought to describe the quality of diabetes care among the Gullah population including both diabetes and HTN.

Research Methods

Research Design

This present study is a secondary analysis utilizing a new set of constructed questions to analyze selected data from the parent study, Project SuGar. The scientific aims of the parent study were to: 1) create a registry of 400 African-American families with type 2 diabetes; 2) isolate the genetic markers that were responsible for the expression of obesity and diabetes; and 3) conduct a genoscan on 430 sib pairs.

This present study used select data from both Project SuGar research participants (*N* = 1,057) to compare with the CDC Diabetes Report Card, NHANES III (*N* = 1,026), and the BRFSS (*N* = 3,059). The Report Card is the first report on quality of diabetes care that used standard measures (DQIP) to document levels of diabetes care. Demographic variables in this study included age (in years), sex, marital, work, and insurance status. The clinical outcomes that were described were glucose, obesity, and self-reported complications. Measured clinical variables for comparisons were BP and HbA1c.

Research Questions of the Present Study

The research questions that guided this present study were:

1. What was the perceived quality of diabetes care in this present study utilizing a set of specific quality indicators (Blood Pressure [B/P], Hemoglobin A1C [HbA1c], and Fasting Blood Glucose [FBG])?
2. What were the similarities between the participants in NHANES III and a sub-set of those participants in Project SuGar on selected biological indices such as BP and HbA1c levels?
3. What was the perceived quality gap as defined by what is recommended by the American Diabetes Association (ADA) and what was found in a sub-set of the participants of Project SuGar? The quality indicators for HbA1c were < 7.0 mg/dL, for BP (SB < 130 mmHg, DP < 80 mmHg), and FBG < 126 mg/dL (ADA, 2008).

Sample

Data was obtained from the larger, Project SuGar sample (*N*= 1, 322), and it included 1,057 Project SuGar research participants. Inclusion criteria for the parent study included 1) African-American Gullah residents who were born or raised on the Sea Islands; 2) biological children of parents who were born or raised on the Sea Islands; 3) two or more biological family members who were diagnosed with type 2 diabetes; and 4) at least one birth parent with Type 2 diabetes. The recruitment goal for the parent study was 400 families, and the project was successful in recruiting 637 Gullah families (Spruill, 2004).

Setting

The original parent study was conducted in South Carolina. South Carolina is a small, rural state divided geographically along racial lines. Most of the African-American populations live in the Low Country, south of the state capital (Columbia), while most of the White population lives in the upper region or north of Columbia. Recruitment for the parent study took place in nine counties identified as the Low Country and/or Sea Islands, also known as the home of the Gullahs. The Gullah homeland begins in Georgetown County and extends south to Beaufort county and 30 miles inland. The Gullah people are direct descendants of enslaved Africans bought to America to work the rice, sugar, and cotton crops. Both cultural and historical records link the Gullahs, also known as the Sea Islanders, to rice cultivating groups from West and Central Africa (Opala, 1999; Pollitzer, 1999). The Gullah population has been of particular

interest to scientific investigators because of its cultural and geographical isolation. Geographic isolation of the Gullahs resulted in greater genetic homogeneity and cultural isolation resulted in the survival of a distinct language and cultural habits. The Gullah population of South Carolina has the lowest racial admixture of any African-American group tested in the U.S. (Pollitzer, 1999; Para, Garvey et al., 2001).

Institutional Review Board Approval

The appropriate Institutional Review Board review was sought. Following Institutional Review Board approval from the Medical University of South Carolina and a combined data sharing agreement with that University and with Hampton University, data were collected from the Family Health Questionnaire and were available from a sample of 1,057 Gullah participants as a sub-set of the larger parent study (Project SuGar). Although the primary investigator for this study was involved in the collection of the original data, permission to share these data was granted by the principal investigator and local citizen advisory committee.

Instrumentation

Accountability Measures

To assess quality indicators, this study used account-ability measures from the Diabetes Quality Improvement Project (DQIP) to assess the quality of care among the Gullahs. The DQIP began under the sponsorship of a coalition and a committee of expert panel members was responsible for developing the set of measurement indicators. The indicators were divided into three categories: 1) accountability, 2) quality improvement, and 3) indicators under field-testing. The accountability measures (HbA1c, Lipid, BP, and eye and foot exam) are well grounded in evidence and have received consensus support from the scientific and medical community (AHRQ, 2005). This study chose to further delimit the accountability measures to two explicit indicators (HbA1c, BP).

Hemoglobin A1c (HbA1c)—Hemoglobin A1c was chosen as an indicator because it is a primary indicator of glycemic control and management over a three month time period. In order to comply with the national data from the CDC 2002 Report Card, 9.5% was used as the first reference point. The study also used more current references such as (7%) from the American Diabetes Association (ADA) and (6.5%) from the American Association of Clinical Endocrinologists (AACE) to describe quality of care among participants.

Blood Pressure (BP)—Measurement of blood pressure was chosen as an indicator because it is a reliable tool, with empirical evidence documenting that controlling blood pressure reduces the risk of cardiovascular disease and complications among persons with diabetes (CDC, MMWR, 2006; DCCT, 1993). In this study, both the old standard of > 140/90 mmHg, and > 130/80 mmHg, were used for persons with T2DM, as these results will allow us to compare the health of the Gullahs to stricter and safer guidelines. Both elevated BP > 140/90 mmHg and HbA1c > 9.5 % have been linked to an increase in diabetes-related complications (DCCT, 1993).

Fasting Blood Glucose (FBG)—Fasting blood glucose was used as an indicator because research has linked poor glucose control with diabetic complications. The Diabetes Control and Complication Trial (DCCT) is considered a landmark clinical study that tested the hypothesis of a direct link between the complications of diabetes and the chronic elevation of plasma glucose. The DCCT study findings show statistically significant reductions in the risk of micro vascular complications, including retinopathy (76%), nephropathy (50%), and neuropathy (60%) in the intensive therapy group. The result of intensive therapy showed a delay in onset and slower progression of these complications. Since the control of blood glucose

reduces the risk of both micro-and macro-vascular complications, the treatment goal is to lower blood levels to normal or near normal in all patients with diabetes. The ADA recommends the following for appropriate target levels for fasting blood glucose (FBG) as < 126 mg/dL for prevention of micro-vascular and < 108 for reducing major vessel damage (ADA, 2008).

Family Health History Questionnaire—Data were collected using an investigator-designed survey called the Family Health History Questionnaire. This study was interested in data that described clinical parameters, self-reported complications, physiological, and social demographical results. The parent study did not ask participants to complete the questionnaire; instead, the research nurse asked and recorded all of the information. The 22-page questionnaire was designed for the parent study and divided into three sections: 1) All about me, 2) All about my diabetes, and 3) All about my family. Examples of some questions included: When were you diagnosed? Do you have any complications and do you use any home remedies to treat your diabetes? Interrator reliability was established at 90% and content validity was established by comparing the questionnaire with similar health history instruments used in other genetic studies by Garvey among the Pima Indians (Hanson, Ehm, Garvey et al., 1999).

Discerning Differences between the Parent Study and the Present Study on Quality Indicators

For this study, the HbA1c greater than 9.5%, and BP greater than 140/90 mmHg were used to comply with standards used in CDC national samples from NHANES III. Complications were categorized as renal or neurological. Dialysis, kidney infection, and impaired renal function were all grouped as renal complications. Foot pain, foot ulcers, leg surgery, claudication, and lower leg amputation were categorized as neurological complications.

Statistical Analysis

Analyses were completed using Statistical Package for Social Scientists (SPSS) version 13.0 (Chicago, IL). Frequencies and percentages were tabulated for all categorical responses. Descriptive analyses were used to compare BP and HbA1c with the CDC Diabetes Report Card and the levels advocated in both AACE and ADA clinical guidelines.

Results

Three research questions were postulated in this present study. The questions will be presented along with their findings.

Research Question 1

What was the perceived quality of diabetes care in this present study using the specific quality indicators of BP, HbA1c, and FBG? In this present study, the quality of care was determined by assessing adherence to the ADA clinical practice guidelines (HbA1c < 7%, systolic blood pressure < 130 mmHg, diastolic blood pressure < 80 mmHg, and blood glucose <126 mg/dL). In this present study, 53.7% had FBG > 126 mg/dL; 68.4% had an HbA1c level > 7.0%; 49.1% had blood pressure > 130/80; and 48.2% reported complications such as foot pain, neurological disorders, or kidney infections. Of these complications, neurological complications were reported more frequently by 44.9% of the participants. These findings indicate sub-optimal care and poor control as evidenced by quality indicators in quality of care results (see Table 2). Although extremely low, 7.3% of these participants reported complications such as impaired renal function and kidney infection. These results are consistent with other findings that highlight poor glycemic control and clinical management of African-Americans with Type

2 diabetes mellitus (T2DM) (Chin, Zhang, & Merrell, 1998;Mainous, King, Garr, & Pearson, 2004;Marshall, 2005;Grant, Buse, & Meigs, 2005).

Research Question 2

What were the similarities between participants in NHANES III and a sub-set of Project SuGar participants on selected biological indices, such as B/P and HbA1c levels? Findings from this present study suggest that both the subjects in the NHANES III and the subjects in a selected sub-set from the Project SuGar study were nearly similar on selected biological indicators. For example, a larger proportion of the participants in the Project SuGar sub-set had an HbA1c > than 9.5% (30.2%) than did their cohorts in the NHANES III (18%). By contrast, among the Project SuGar participants, fewer had BP greater than 140/90 mg/dL (29%) as compared to the NHANES III participants (34%) (see Table 4).

Research Question 3

What was the perceived quality gap as defined by what is recommended by the ADA and what was found in a sub-set of the Project SuGar participants (HbA1c < 7.0%, BP (SB < 130) mmHg), DP < 80 mmHg, and FBG < 126 mg/dL) (ADA, 2008). Findings from this present study indicate that 49.1% of the participants had a BP > 130/80 mmHg, 68.4% had an HbA1c > 7%, and 53.7% had a fasting blood glucose greater than 126 mg/dL. When compared to the more liberal NHANES guidelines, findings from this study revealed sub-optimal care for diabetes among the sub-set of participants from Project SuGar as compared to their cohorts from the NHANES III. For example, as indicated earlier, a greater proportion of Project SuGar participants (30.2%) had an HbA1c > 9.5% as compared to their NHANES counterparts (18%). Whereas, for the Project SuGar participants, a smaller percentage (29%) had a blood pressure of > 140/90 mmHg, as compared to their NHANES counterparts (34%) (see Table 5). The American Diabetes Association Clinical Guidelines recommends that persons with T2DM maintain an HbA1c < 7%, a BP < 130/80 mmHg, and fasting blood glucose of less than 126 mg/dL. Given these guidelines, and the fact that the participants in sub-set of Project SuGar had biological indicators in most cases greater than the guidelines, this may therefore indicate a quality gap in diabetes care.

Socio-demographic and Clinical Data—Socio-demographic and clinical data were available on 1,322 participants, however, blood work was not available on all participants for a variety of reasons, e.g., participant was not fasting, researchers were not able to obtain specimens, and so on. Since complete data were missing at random, those with missing data were compared to those with full data and no differences were found in age and gender, and complete blood work was available on 1,057 participants. Seventy-one percent of the participants were female with an average age of 52.9 years and 67.9% were obese. All of the participants (N = 1,057) in the study had a family history of diabetes. The NHANES III and Project SuGar comparison results are presented in Table 4, the quality of care results are presented in Table 2, and the quality gap is presented in Table 5.

Discussion

This was a secondary analysis from a parent study that compared selected data to the CDC Diabetes Report Card, the National Health and Nutrition Examination Survey (NHANES III), and the Behavioral Risk Factor Surveillance System (BRFSS). Quality of care in this study was defined by Campbell, Roland, and Buetow (2000) as goals that have been met. It is that portion of a patient's out-come over which health-care providers, whether individuals or organizations, have control (Chin & Muramatsu, 2003). According to Campbell and colleagues (2000), quality of care has two main principles: access and effectiveness. Specifically, quality of care is concerned with the following questions: Do users get the care they need? Is the care

clinically effective when they get it? What was the outcome of the care? Quality of care research among minorities is not new and many of the results are similar. In this present study, analysis of these data suggest that quality of diabetes care was poor to sub-optimal because a greater proportion of the subjects receiving care still had poor gylcemic control as manifested by their higher FBG and HbA1c levels. Moreover, these subjects also had poor control of their BP, which augments the FBG and HbA1c levels, thereby further contributing to the chronicity of diabetes. Similar to these findings, Brown and colleagues (2005) studied quality of care with a sample of 7,456 participants in a managed care setting. Cross-sectional analysis was used and the process of care quality indicators from the ADA(HbA1c < 7.0 mg/dL, BP [SB < 130 mmHg, DP < 80 mmHg], and FBG < 126 mg/dL) as well as a foot and dilated eye exam, aspirin therapy, and influenza vaccination were assessed. Findings from that study indicated that most of the quality indicators were comparable across race/ethnicity lines. For example, while African-Americans had a lower percent of Hb1Ac, LDL, and influenza vaccinations, they had higher rates of foot and dilated eye examinations than did their White counterparts. In fact, African-Americans were more likely to have the poorest blood pressure and lipid control than did their White counterparts.

Chin, Zhang, and Merrell (1998) conducted a research study to determine whether African-Americans who were Medicare recipients with diabetes were at increased risk for morbidity, poor quality of care, and high resource utilization. They used the Medicare Beneficiary Survey to analyze 1,376 patients who were over 65 years of age. The quality-of-care measures were glycosylated hemoglobin measurements, ophthalmology visits, lipid testing, mammography, influenza vaccination, and readmission within 30 days of discharge. The results indicated that when compared to White patients, only 26% of African-American patients had any measures for glycosylated hemoglobin and 43% had lipid measurements. African-Americans had worse health perceptions, had a lower quality of care, were more likely to visit the emergency room, and had fewer physicians' visits per year. These researchers concluded that improved access to preventive care for older adults with diabetes might improve health perception. Although the average age in this present study was 52.9 years, the HbA1c results were similar.

Other studies have supported quality of care and its correlation to good gylcemic control among diabetes. In fact, quality of diabetes care continues to be the topic of many research studies because although standards of care for diabetes have been widely published since the early 1980s, physicians have been hesitant to adopt the recommended guidelines and are often frustrated when treating ethnic minority patients. Puder and Keller (2003) found that HbA1c and blood lipids were measured in only about half of the patients and most patients were below targeted HbA1c goals. This supports the findings that have been reported earlier that over half or 68.4% of the subjects were below the targeted HbA1c goal. In addition, in the present study, it was found that while blood pressure was frequently measured, it was controlled in only less than half of the Project SuGar participants.

In a similar quality of care study, Larme and Pugh (1989) pointed out that physicians not only fail to adhere to practice guidelines, they fail for some of the same reasons that patients fail to adhere to treatment. These reasons include their attitude toward diabetes, the complexity of managing the disease, and their perception that neither the health-care system nor the society supports their efforts to control diabetes. Although this was not an aim of this study, future research among rural African-American populations should consider adherence to treatment by both physicians and patients.

Regarding similarities or differences to NHANES III, in the present study, as indicated earlier, it was found that among the sub-set of Project SuGar participants, fewer had BP > 140/90 mmHg as compared to the NHANES III participants. In contrast, among the sub-set of the Project SuGar participants, a larger proportion had HbA1c greater 9.5% as compared to their

counterparts in the NHANES III sample. The NHANES III study documented the quality of diabetes care among 3,000 participants ranging from 18 to 75 years of age. However, only 16% or 164 participants were identified as African-Americans. In addition, NHANES III reported that 56.6% of African-Americans had BP > 140/90 mmHg and 27.1% had HbA1c > 9.5%. An unexpected finding from this study was the similarity in health disparities in outcome measures between both groups of African-Americans.

Regarding quality gaps in diabetic care, findings from this present study suggest that there is a quality gap (the difference between present treatment success rates and those thought to be achievable using best practice guidelines) as evidenced by the inability to reach the desired goal for gylcemic control (HbA1c, BP, and FBG). In fact, personal goals for HbA1c, BP, FBG, recommended by the ADA were not realized by Project SuGar participants, resulting in a quality gap in care. Supporting these findings, an assessment study on the quality gap of diabetes care in academic centers was conducted by the University Health System Consortium (UHC) Diabetes Benchmarking Team Project. They assessed the gap and quality of care in 30 academic medical centers from 2000 to 2002. Although annual HbA1c testing rates were high, testing did not necessarily translate into effective metabolic control, suggesting that although patients might be tested, both patient and provider fail to follow through on abnormal results (Grant, Buse, & Meigs, 2005).

Quality gap research is not new. When discussing quality gap in care among Project SuGar participants, differences in the quality of health care targeted to and received by members of population groups are critical to understanding and improving disparities in healthcare. In this secondary analysis of selected data, the results suggest not only disparities in health care, but also the existence of a quality gap in diabetes care similar to findings from CDC Report Card. Even when the results were compared to liberal results in the CDC 2002 Report Card, disparities exist as well as a gap in services.

Limitations

Since complications were self-reported by patients, validation was not always possible. Therefore, it is possible that patients could have overestimated problems or failed to identify important complications. This study only used two quality indicators (BP, HbA1c) for comparisons with the NHANES III/BRFSS national sample. Other indicators (even though collected) such as ancillary services, self-management behaviors, and lipid levels were not used in this comparative analysis, and they can be found in print elsewhere. This study did not compare the Gullahs with the African-Americans in the national sample because this study was interested in highlighting racial disparities. Moreover, few or no reporting of rural dwellers were limitations within the NHANES III report. Since the Gullah population may have characteristics in common with other rural African-American communities such as social networking, social isolation, and poor access to care, these findings may be applicable to other isolated populations in understanding complications related to uncontrolled diabetes and disparities in healthcare.

Implications for Further Research and Practices

Although this study did not compare the Gullahs with African-Americans, in general, in the NHANES III, the BRFSS, or the CDC Diabetes Report Card, the BP and HbA1c results from African-Americans were similar. This comparison would be ideal in a further study as well as comparisons involving access to care. Poor access to care (although not a part of the original questions), is thought to be the main factor contributing to the quality gap in diabetes care (Mainous, King, Garr, & Pearson, 2004).

Access to care is a problem in South Carolina for several reasons. These reasons include both rural isolation and an inadequate number of practicing providers, as less than 3% of practicing providers are African-Americans. Even though African-Americans represent 40% of the rural population, and 42% of the very rural population of South Carolina, the number of primary care providers in rural areas is dwindling and the number of minorities graduating from medical school is disheartening (The Burden of Diabetes in South Carolina, 2004). Most of the providers are located within three major cities (Charleston, Columbia, and Greenville) and few practice in rural counties with a high prevalence of diabetes. Forty-three of South Carolina's 46 counties are classified as medical shortage areas (The Burden of Diabetes, 2004). For future research, poor access care and health literacy ought to be addressed especially where African-Americans generally, and the Gullahs specifically, are concerned. Health literacy is defined as a patient's ability to read, to comprehend, and to act on medical instructions and it is known to impact health outcomes as well. It is common among the elderly, among ethnic minorities, and among patients with chronic conditions such as diabetes (Schillinger et al., 2002). Health literacy in South Carolina is problematic, as only 23% of students passed the state's required proficiency examination (Office of Research and Statistics, 2006). Although 83% of people over 20 years of age have a high school diploma, South Carolina is ranked as number 40 for the number of students completing high school. Moreover, according to the Office of Research and Statistics (ORS), 215,776 people have less than a 9th grade education (ORS, 2006).

Conclusions

In summary, health disparities, sub-optimal care, and a quality gap exist in the Gullah family members who participated in the Project SuGar research study, as evidenced by the accountability indicators (HbA1c, FBG, and BP). Renewed efforts, with culturally appropriate approaches that are aimed at consistency with nationally published guidelines, might decrease quality gaps and improve outcomes in diabetes care, but additional research is needed for this hypothesis. In addition to provider adherence to guidelines, culturally relevant educational programs are needed. It is important to understand the differences in quality of healthcare targeted to and received by members of population groups, because these differences can affect the development and utilization of intervention programs. Other isolated rural population groups should be assessed as well, to determine if there are other pockets of the U.S. population in need of public health efforts and public policies to improve their healthcare.

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Table 1

Racial and Health Disparities in South Carolina and the United States.

Diseases	United States	South Carolina	African-Americans in South Carolina	Whites in South Carolina
T2DM	7%	9.6%	13.1%	8%
HTN	24.8%	28.8%	29.9%	23%
Obesity	23.2%	25.1%	37.3%	20.3%

Source: CDC 2003, South Carolina Burden of Diabetes Report, 2004, BRFSS, 2006, MMR Weekly Report, 2006

Table 2

Quality of Care (*N* = 1,057).

Variables	Percentages	Frequencies
Fasting Blood Sugar	53.7% > 126 mg/dL	568
Blood Pressure	49.1% > 130/80 mmHg	519
HbA1c	68.4% > 7%	723
Complications (Reported)	48.2%	568

Table 3

Participants' Characteristics (N = 1,057).

Variables	Percentages	Frequencies
Female	77.1%	815
Married	32.2%	340
Working (F/PT)	25.9%	274
Uninsured	69.1%	730
Overweight (BMI 25–29.9)	23.1%	244
Obese (BMI 30)	67.9%	717

Table 4

Comparison between Project SuGar and NHANES III (*N* = 1,057).

Variables	Project SuGar	CDC/NHANES III
Accountability Indicators		
HbA1c > 9.5%	30.2%	18%
BP >140/90 mmHg	29%	34%

Table 5

Quality Gap (*N* = 1,057).

Variables	Percentages	Frequencies
HbA1c > 6.5%	74.4%	786
HbA1c > 7.0 %	68.4%	723
BP > 140/90 mmHg	29%	307
BP > 130/80 mmHg	49.1	519
FBG > 126 mg/dL	53.7%	568