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Diabetes Risks and Health Literacy in Southern African American and Latino Women

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Abstract

Minority women experience health disparities, especially related to diabetes. The purpose of the paper is to examine diabetes risk in minority women. A survey design was used to recruit 52 African Americans (AA) and 48 Latina women. Participants described their health, health behaviors, and health literacy. Blood pressure and BMI were measured. AA women had more diabetes risks than Latinas, and older women had more risks than younger women. All of the women had low health literacy. Women with higher numbers of diabetes risks had lower health literacy. Findings can be used to develop diabetes prevention and education programs.

African Americans (AA) and Hispanic/Latinos suffer disproportionately from chronic disease such as diabetes and related risk factors including overweight, obesity, increased waist circumference, high cholesterol, high blood pressure, and high blood sugar (Agency for Health Research and Quality [AHRQ], 2012). Minority women in particular have a high incidence and prevalence of diabetes and diabetes related risks. Diabetes affects 17.1% of AA women and 18.7% of Hispanic women 45 – 64 years of age compared to 10% of non-Hispanic white women. Among women 65–74 years of age, 31.4% of black women and 32.6% of Hispanic women have been diagnosed with diabetes compared to 18.4% of non-Hispanic white women (Center for Disease Control and Prevention [CDC], 2012). Additionally, Hispanic women and African American women born in 2000 have a 52.5% and 49% risk, respectively, of developing diabetes in their lifetime, which far exceeds the 31.2% risk for non-Hispanic white females (CDC, 2011).

Diabetes risk and prevention

Once diagnosed with diabetes, AAs and Latinos are less likely than non-Hispanic whites to receive A1C tests (National Diabetes Fact Sheet, 2011). African Americans and Latino Americans are more prone to complications, in part because of failure to monitor blood glucose, and have their cholesterol checked (Gavin, Fox, & Grandy, 2011). Also, the poor, near poor, and those with lower educational levels (McCleary-Jones, 2011) receive less diabetes recommended care, and persons in nonmetropolitan areas receive less

recommended diabetes care than those in metropolitan areas (Hunt, Whitman, & Henry, 2014; Sadowski, Devlin, & Hussain, 2012). AAs and Latinos are more likely to be hospitalized for diabetes complications than non-Hispanic whites and those with higher incomes (AHRQ, 2012).

African American women are more likely to have the diabetes-related conditions of obesity and high blood pressure, and are more likely than AA men to develop complications of heart disease and stroke (American Heart Association [AHA], 2013). Recent findings revealed that for the years of 2011–2012, 36.1% of American women were obese and of these, 44.4% of Latino and 56.6% of AA women were obese, a significant risk factor for diabetes (Ogden, Carroll, Kit, & Flegal, 2013). Similarly, 29% of AA women are more likely to die of cardiovascular diseases when compared with non-Hispanic white women and Hispanic women (Fryar, Chen, & Li, 2012).

Culturally relevant diabetes prevention and self-management education (DSME) are an essential component of improvement in self-care behaviors (American Diabetes Association [ADA], 2011; Peña-Purcell & Boggess, 2014). Successful DSME, which is dependent upon several factors including patient health literacy levels, understanding of oral and written educational materials, and delivery of culturally tailored programs, (Peña-Purcell & Boggess, 2014), has a direct effect on health outcomes (McCleary-Jones, 2011; Yamashita, & Kart, 2011). Thus, the capacity to understand educational information, verbal or print, about diabetes is a critical component in diabetes prevention and self-care.

Several factors are related to diabetes health disparities, including health literacy. Diabetes self-care is an essential component of diabetes self-management. However, self-management is dependent upon patient education. Thus, understanding information about preventing early onset or consequences of diabetes risk and disease process has a direct effect on health outcomes (McCleary-Jones, 2011; Yamashita & Kart, 2011). Often, these materials are written at levels that low-literate patients cannot understand (McCleary-Jones, 2011). One approach to prevention and diabetes care is patient centered and individualized care to meet patient values and needs (Inzucchi et al., 2012). Community health workers providing individualized care focused on prevention and diabetes care have shown to improve patients' health literacy and as a result improve patients' understanding of diabetes, diabetes self-management, and clinical outcomes (Otero-Sabogal et al., 2010; Spencer et al., 2011).

Health Literacy

The Patient Protection and Affordable Care Act of 2010, defines health literacy as “the degree to which an individual has the capacity to obtain, communicate, process, and understand basic health information and services to make appropriate health decisions” (CDC, n.d.). Previous health literacy definitions have not included the term “communicate” (Osborn, Cavanaugh, Wallston, Kripalani, Elasy, Rothman, & White, 2011; U.S. Department of Health and Human Services [U.S. DHHS], n.d.), yet a person's ability to communicate as part of making appropriate health decisions is essential (AHRQ, 2011a; Sorensen et al., 2012). According to the National Center for Education Statistics, in the past

decade approximately 41% of Hispanics, 24% of African Americans and 9% of non-Hispanic whites were reported to have below basic health literacy skills (Osborn, Cavanaugh, Wallston, Kripalani, Elasy, Rothman, & White, 2011).

Health Literacy and Illness

Low health literacy has been linked to greater risk of death and an increased number of emergency room visits and hospitalizations (AHRQ, 2011b). Health literacy has been shown to be related to age, educational level, race/ethnicity, income (Almader-Douglas, 2013; Bennett, Chen, Soroui, & White, 2009; Lehna & McNeil, 2008; Schillinger, et al., 2008) and nutritional intake (Speirs, Messina, Munger, & Grutzmacher, 2012). Several authors reported knowledge and awareness of heart disease (Mochari-Greenberger, Miller, & Mosca, 2012) and hypertension (Yoon, Burt, Louis, & Carroll, 2012) were lower among Hispanics than African Americans, but both minority groups were lower than non-Hispanic whites. In addition, younger age, lower education, and lower income were related to a lack of awareness of heart disease prevalence and symptoms in both African American and Hispanic women (Mochari-Greenberger, et al., 2012).

Low health literacy related to chronic disease (CVD and diabetes) symptoms and risk have been documented in AAs, Hispanics, and women (Bennett et al., 2009; Willey, Williams, & Boden-Albala, 2009). One study showed that the level of health literacy may affect ability to carry out self-care and treatment (Chen, Yehle, Plake, Murawski, & Mason, 2011). However, patient health literacy levels are not often assessed by health care providers (Chew et al., 2008). Further, some authors are not convinced that health literacy should be measured or is related to diabetes prevention or care outcomes (Al Sayah, Majumdar, Williams, Robertson, & Johnson, 2013). The Joint Commission and the Agency for Health Care Research and Quality urge health care providers, practitioners, and administrators to consider health literacy as an important part of communicating and understanding patient interactions, care and outcomes (Corrarino, 2013; Stiles, 2011; Yamashita & Kart, 2011). Determining health literacy among minority groups of women and the relation to diabetes risks may assist in developing culturally specific interventions and best practices for chronic illnesses such as diabetes care to meet the women's cultural health needs and match their lifestyles. Cox's Interaction model (IMCHB) of client health behavior was used to guide the study.

Conceptual Framework

The IMCHM focuses on the relationship between individual client characteristics, and providers' behaviors that can influence health outcomes. Use of the IMCHB allows for addressing the relationships between client characteristics and health outcomes, such as diabetes risk, as well as client characteristics, health literacy, and health outcomes. The model emphasizes the process by which clients and providers achieve health outcomes. The model includes three constructs: Client Singularity, Client-Professional Interaction, and Health Outcomes (Cox, 1982). Elements of Client Singularity include demographic characteristics, social influences, environmental resources, and previous health care experiences. The Client-Professional Interaction refers to the relationship between health

care professionals and clients, and in this study was operationalized as health literacy. Health outcomes are impacted by client singularity and client professional interactions. The Health Outcome in this study was health status, defined as the specific type and total number of diabetes risks. This framework has been used to examine health behavior and other outcomes (Cox, 1982, 1986; Cox, Sullivan, & Roghmann, 1984). More recently, the framework has been used to examine patient satisfaction with nursing care (Wagner & Bear, 2009), advanced practice nursing (Matthews, Secrest, & Muirhead, 2008), and Latina women's health (Hernandez, 2011).

Purpose

The purpose of this study was to assess diabetes risk in a sample of African American and Latina women, the difference in diabetes risk between the minority groups, and to examine the relation of personal characteristics and health literacy to diabetes risk.

The following research questions were addressed:

1. What is the difference in diabetes risk between African American and Latino women?
2. Are elements of Client Singularity: (race/ethnicity, age, marital status, having a high school education, and difficulty paying bills) predictors of diabetes risks?
3. What is the difference in health literacy between African American and Latino women?
4. Are elements of Client Singularity: (race/ethnicity, age, marital status, having a high school education, and difficulty paying bills) related to health literacy?
5. Are elements of Client Singularity: race/ethnicity, age, marital status, having a high school education, and the Client Professional Interaction (health literacy) combined predictors of diabetes risks?

Methods

A cross sectional survey design with face to face data collection was used. The convenience sample of 90 African American and Latino women were recruited from community and health care settings in counties with high proportion of AAs (20–35%), and Latinos (5%–11.30%) (U.S. Census Bureau, 2012). All areas were medically underserved areas or had medically underserved populations (U.S. Department of Health and Human Services, 2014). North Carolina (NC) is in the buckle of the stroke belt and was designated a “diabetes hot spot” in 2012 (PR Newswire, 2011). In fact, in NC, diabetes is ranked seventh as the leading cause of death. If diabetes remains unchecked, it is predicted that annual health care costs in NC will exceed \$17 billion by 2025 (Konen & Page, 2011).

Sample and recruitment

In the community settings, bilingual flyers and announcements were made available in churches, workplaces, and tables or booths set up at grocery stores. Women enrolled in the study met the following inclusion criteria: 1) age 25 years and older, 2) self-identification as

African American or Hispanic/Latina, 3) orientated in time, place and person, 4) English or Spanish speaking, reading and understanding. Women were excluded if they had a new mental health diagnosis in the past 3 months, were known to be pregnant, or had been institutionalized or incarcerated. Team members scheduled appointments to obtain written informed consent and collect data. Data collection was held in private rooms at churches, trailer parks, workplaces, community centers, homes, homeless clinics, and a subsidized retirement apartment complex. Sessions for data collection lasted 30–60 minutes. Women were provided a \$25 gift card to a local store as an incentive. IRB approval for this study was received from the University of North Carolina at Greensboro.

Measures

A *Demographic and Health Status* form was used to collect data on client singularity (age, race/ethnicity, and gender). Social influences included marital status, and number of years of formal education. Environmental resources were income level, presence of health insurance (including Medicare and Medicaid) and income adequacy. Income adequacy was a self-report of difficulty paying their monthly bills. Previous health care experiences included seeing a health provider in the past twelve months, perceived health status, and perceived health experiences.

Blood pressure was measured in a sitting position (two times five minutes apart and averaged) using standard protocols. HbA1c was collected by finger stick using a Bayer A1C NOW instrument. Standard calibrated medical equipment was used to measure height and weight for BMI calculation. The Principle Investigator and community Registered Nurses supervised and participated in all data measurement.

Health Literacy Scale—The Consumer Assessment for Healthcare Providers and Systems (CAHPS) item set for addressing health literacy (CAHPS Consortium, 2009) was used to measure health literacy. This tool, developed by AHRQ and partners to improve patient centered quality of care, consists of 29 items on a 4-point Likert scale (1 = never to 4 = always). The Spanish version of this tool consists of 30 items, with an additional item about the availability of questionnaires in Spanish, with a similar response set. The tool was field tested by RAND and DataStat, Inc., for reliability and validity in the English and Spanish versions with minority populations. Reliability was .89 and validity, using a 2-factor categorical confirmatory factor analysis model, with .958 (Comparative Fit Index) and .953 (Tucker-Lewis Index) (CAHPS Consortium, 2009; Moskowitz, Lyles, Karter, Adler, Moffett, & Schillinger, 2013; Weidmeier, Brach, & Hays, 2012). The alpha reliability coefficient was acceptable at .815 for this study.

Diabetes risk health outcome information was collected by asking the women if a doctor or nurse had ever told them that they had high blood pressure, high cholesterol, heart disease, obesity, or diabetes. Diabetes risk was defined as the total of the number of risks, which included a history of hypertension (diagnosed, on medications, or readings greater than 135 systolic or 80 diastolic), diabetes (diagnosed, medications or HbA1c greater than 6.99), BMI greater than 25 kg/m², high cholesterol (diagnosed or taking medications) and CVD disease

(diagnosed Heart attack, stroke or heart disease; medications) using National Diabetes Information Clearinghouse ([NDIC], 2013) guidelines.

To avoid any reading literacy concerns or embarrassment related to illiteracy, the surveys were read to participants by bilingual trained research assistants, investigators or community health workers. The interview and surveys were available in English or Spanish, by client choice, with all AA women choosing English and all Latino women choosing Spanish. An identifier code for paper and computer stored data was assigned for all study participants to provide anonymity of responses.

Data Analysis

Data were doubled entered and assessed for accuracy. Client singularity (demographic, social influences, environmental resources, previous health care experiences) and health status (diabetes risk) were tabulated with measures of central tendency (mean, mode, frequency, proportion) appropriate to the level of measurement. The client professional interaction variable (health literacy) was computed. A significance level of .05 alpha was used for statistical tests. SPSS-PC and SAS were used to manage data and compute statistics.

Results

The mean age of women was 48 years of age with a range from 25 to 89 years. Fifty two percent of the women were AA (see Table 1). More than half of the women (67.8%) had a high school education or greater. The majority of women were married (54%) and had incomes of \$29,999 or less. Forty-six percent of the sample reported no health insurance. Thirty-seven percent of participants considered their health to be either fair or poor. The majority of the women had seen a physician within the last 12 months (see Table 2). When asked about their health care experiences, 5.6% rated previous health care experiences as excellent, while 57.8% rated it as good. Twenty-three percent of the women were told that they had diabetes and 90% were considered obese (see Table 3) by the BMI calculations ($M=32.032$, $SD=6.86$, range 18.63–55.41). Systolic blood pressure averaged 130.15 mmHg ($SD=25.31$, range 87–209) and diastolic BP averaged 79.76 mmHg ($SD = 14.02$, range 58–120). Three month blood sugar management by HbA1c averaged 6.52 $SD=1.77$, range 4.8–13.0), indicating multiple women may have undiagnosed diabetes.

The average number of diabetes risks for the sample numbered more than two and a half ($M = 2.68$, $SD = 1.41$, range 2.00–6.00). African American women had more diabetes risk factors than Latino women ($M = 3.23$, $SD 1.46$, and $M = 2.09$ $SD = 1.08$ respectively). There was a significant difference in the number of diabetes risks ($t(88) = 4.16$, $p = .000$), indicating that AA women had a significantly higher number of diabetes risk factors. Seventy-seven percent ($n=69$) of the women had two or more risk factors for diabetes (see Table 3). Obesity, hypertension and high cholesterol were the most frequent risks.

With consideration of all variables in question two, client singularity variables (race/ethnicity, age, marital status, having a high school education, and difficulty paying bills) were predictors of diabetes risks. The regression model was statistically significant in

predicting total number of diabetes risks, accounting for 52% of the variance in the outcome. Further examination showed that when regressing the number of diabetes risks on race/ethnicity, age, marital status, education and difficulty paying bills, only age was significant, indicating that older women had more diabetes risks (see Table 4).

For research question three, Twenty-nine items were used to measure health literacy ($M = 40.01$, $SD = 11.99$, $Range = 48.00$) with a higher number indicating a higher level of health literacy. The difference in the level of health literacy between AA and Latino women was not significant ($t(86) = -1.06$, $p = .292$). However, Latino women were slightly more health literate than AA women ($M = 41.4$, $SD = 12.5$; $M = 38.7$, $SD = 11.4$ respectively). For research question four, Pearson correlations were first reviewed. Women not married had higher health literacy and older women had higher literacy. Health literacy was regressed on the socio-demographic variables of race/ethnicity, age, marital status, having a high school education, and difficulty paying bills. The equation was not significant for any predictors of health literacy ($R^2 = .036$, $F(.598)$, $df = 5$, $p = .701$). In research question five, number of diabetes risks were regressed on race/ethnicity, age, marital status, education, difficulty paying bills and health literacy. The model was predictive of the number of diabetes risks. However, only age was independently significant, indicating that older women had more diabetes risks (See Table 5).

Discussion

Seventy-seven percent of these minority women were found to have two or more diabetes health risks; ninety percent had risk with just the presence of obesity. This is consistent with findings of the CDC (2011, 2013) and Office of Minority Health (2010). AA women were found to have more diabetes risk factors than Latino women. In addition, older African-American and Latino women were found to have more diabetes health risks than younger women, which is consistent with statistics of the American Diabetes Association (ADA, 2011) and other researchers (Ogden, Carroll, Kit, & Flegal, 2013). The high level and combination of risks in this sample are concerning. The most prevalent risk factor are preventable through patient and provider action, and obesity is linked to many of the other risk factors for diabetes and cardiovascular disease. Although health literacy for both groups was low, there were no significant differences between the groups. Women who had more diabetes risks were found to have lower health literacy which is consistent with previous findings (Bains & Egede, 2011; Coffman, Norton, & Beene, 2012; McCleary-Jones, 2011). However, the client provider interaction variable (health literacy) in this study was not a predictor of the total number of diabetes risks, perhaps because all women were high risk and low in health literacy.

Women had high numbers of diabetes risks and require cultural and literate appropriate interventions to increase understanding and ability to prevent diabetes related risk factors, the consequences of those factors, and to manage diabetes (American Association of Diabetes Educators, 2012; Benjamin, 2010; The Joint Commission, 2007). Health literacy has been related to self-care and treatment (Chen, Yehle, Plake, Murawski, & Mason, 2011), and low health literacy is consistently associated with less diabetes knowledge (Al Sayah, Majumdar, Williams, Robertson, & Johnson, 2012) and with poor health care access and

outcomes (McKee & Paasche-Orlow, 2012). Schillinger and colleagues (2008) found that interventions that included health literacy had positive health outcomes. In addition, older women were found to be less health literate and to have sociodemographic factors that significantly impacted their diabetes risks (NDIC, 2013; Yamashita & Kart, 2011;). For example, the majority of women in this study had incomes below \$29,999, which puts them at high risk for diabetes related factors. Previous authors (Bennett, Chen, Soroui, & White, 2009; Lehna & McNeil, 2008; Schillinger, et al., 2008) have reported that health literacy was related to age, educational level, race/ethnicity, and income. These findings point to the need for diabetes risk interventions, inclusive of health literacy, focused on older minority women by multiple levels of providers and professionals.

Limitations

This study was limited to volunteer women, who may or not be representative of all minorities. Regardless, the findings provide important insight into the most vulnerable women who may experience multiple morbidities and consequences of diabetes during their lifetimes.

Conclusions

Findings of this study validate that disparities in morbidity, mortality and care delivery persist. Although CDC officials have reported improvements in 29 health care categories, disparities in the areas of race and gender continue (CDC, 2013). Prevention and self-care are essential components of preventing the onset and controlling or alleviating the consequences of diabetes. However, prevention and self-management is dependent upon patient involvement and interaction with the provider. Often this interaction and sharing of information is provided at levels that culturally diverse or low-literate patients cannot understand. Studies have shown that patient understanding of information is an important factor in preventing diabetes risk factors and in diabetes self-care (McCleary-Jones, 2011; Yamashita, & Kart, 2011). Prevention and self-management written materials should integrate and include the literacy level of disparate groups and the age context of the recipients. In this study, older women were found to have more diabetes risks. These older women may benefit from preventive interventions for diabetes risk, especially those risks that are highly prevalent in minority women. The Patient Protection and Affordable Care Act (The Patient Protection and Affordable Care Act Detailed Summary, nd) discusses New Patient Care Models such as Accountable Care Organizations (ACOs) which will be focused on cost and quality of care received by patients and best practices by health care providers. Diabetes prevention, including exercise, healthy eating, stress management, and weight management, is required. In addition, health literacy attention by providers, practitioners, systems and new models of care such as (ACOs) will be important to deliver quality and cost effective care to minority groups in an effort to decrease the current disparities in care (Ratzan, 2009; Sorensen et al., 2012). Future research is needed that focuses on diabetes risk and the role of health literacy among various age groups of minority and ethnically-diverse women and men to better understand how best to improve health outcomes for these groups.

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Table 1

Client Singularity variables (N=90)

Variable	N	Percentage (%)
Demographic Characteristics		
African American	47	52.2
Latino/Hispanic	43	47.8
Environmental Resources:		
HS or more	61	67.82
Difficulty pay bills	34	37.8
Income < \$29,999	62	80.6
No insurance	41	46.1
Social Influence:		
Married	47	54.0

Table 2

Health Indicators (N = 90)

Previous Health Care Experiences	N	Percentage (%)
Saw health care provider in past 12 months	80	93.0
Hypertension	45	50.6
Diabetes	21	23.3
Overweight/Obese	81	90.0
High Cholesterol	31	34.4
CVD diagnosis	9	10.0

Table 3

Diabetes Risk (N = 90)

Number of Risks	N	Percentage (%)
2 Risks	23	25.6
3 Risks	19	21.1
4 Risks	18	20.0
5 Risks	6	6.7

Risks: history of hypertension, diabetes, overweight/obese, high cholesterol, and CVD disease.

Table 4

Regression Analysis for Predictors of Diabetes Risk

Variable	B	SEB	β
Race	-.402	.309	-.144
Age	.059	.008	.662*
Married	.004	.241	.001
Education	-.185	.266	-.062
Diff pay bills	-.144	.236	-.050

Note: N=86,

*
p<.05 $R^2 = .533$, F (18.475), df = 5, p .000.

Table 5

Predictors of Diabetes Risk, including health literacy

Variable	B	SEB	β
Race	-.365	.316	-.131
Age	0.58	.008	.662*
Married	-0.18	.251	-.007
Education	-.213	.272	-.071
Diff pay bills	-.167	.246	-.058
Health Literacy	-.003	.009	-.026

Note: N=84,

*
p<.05 $R^2 = .527$, F (14.459), df = 6, $p = .000$.