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Primary and Specialty Medical Care Among Ethnically Diverse, Older Rural Adults With Type 2 Diabetes: The ELDER Diabetes Study

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Abstract

Purpose—Residents in rural communities in the United States, especially ethnic minority group members, have limited access to primary and specialty health care that is critical for diabetes management. This study examines primary and specialty medical care utilization among a rural, ethnically diverse, older adult population with diabetes.

Methods—Data were drawn from a cross-sectional face-to-face survey of randomly selected African American (n = 220), Native American (n = 181), and white (n = 297) Medicare beneficiaries ≥65 years old with diabetes in 2 rural counties in central North Carolina. Participants were asked about utilization of a primary care doctor and of specialists (nutritionist, diabetes specialist, eye doctor, bladder specialist, kidney specialist, heart specialist, foot specialist) in the past year.

Findings—Virtually all respondents (99.0%) reported having a primary care doctor and seeing that doctor in the past year. About 42% reported seeing a doctor for diabetes-related care. On average, participants reported seeing 2 specialists in the past year, and 54% reported seeing >1 specialist. Few reported seeing a diabetes specialist (5.7%), nutritionist (10.9%), or kidney specialist (17.5%). African Americans were more likely than others to report seeing a foot specialist ($P<.01$), while men were more likely than women to have seen a bladder specialist ($P = .02$), kidney specialist ($P = .001$), and heart specialist ($P = .004$), after adjusting for potential confounders. Predictors of the number of specialists seen include gender, education, poverty status, diabetes medication use, and self-rated health.

Conclusions—These data indicate low utilization of specialty diabetes care providers across ethnic groups and reflect the importance of primary care providers in diabetes care in rural areas.

Approximately 18 million Americans have diabetes,[1] and the prevalence of diabetes has increased dramatically in recent years.[2] Diabetes is the sixth leading cause of death in the United States,[3] and health care spending for people with diabetes is more than double that of people without diabetes.[4] Direct and indirect costs associated with diabetes exceed $130 billion

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annually.[4] Rates of diabetes and diabetes-related complications are particularly high among older adults, ethnic minority groups (African Americans, Native Americans, Hispanics), and people of low socioeconomic status.[1]

Diabetes places a tremendous health burden on patients with this disease, increasing the risk of major complications such as retinopathy, end-stage renal disease, cardiovascular disease, and lower-extremity amputation.[5] Interaction with primary and specialty health care providers is an important component of reducing the risk of complications among people with diabetes. This interaction is necessary to detect disease prior to the onset of signs and symptoms, to monitor glycemia, retinopathy, blood pressure and cholesterol control, and to make appropriate medication adjustments.[6]

Evidence suggests that ethnic and gender disparities exist for access and utilization of health care in general,[7] and for diabetes care and diabetes treatment outcomes.[8,9] Ethnic minorities in rural communities may be at additional risk for inadequate health care due to significant barriers that exist in rural communities (eg, lack of public transportation, low physician/patient ratio).[10,11] This lack of access and utilization of health care may in part explain the high rates of diabetes-related morbidity and mortality among ethnic minorities compared to whites.

There are few studies documenting utilization of health care among rural older adults with diabetes. This paper examines the utilization of primary and specialty health care among older rural adults with type 2 diabetes. Particular attention is paid to gender and ethnic differences in utilization patterns in this population.

Methods

Study Description

The ELDER (Evaluating Long-term Diabetes Self-management Among Elder Rural Adults) Study, a 4-year study funded by the National Institute on Aging and the National Center for Minority Health and Health Disparities, is a population-based cross-sectional survey designed to comprehensively assess the self-care strategies of older rural adults (age ≥65 years) with diagnosed diabetes and the impact of these strategies on diabetes control. Participants for the study were selected from 2 counties in central North Carolina.

The counties were selected because they are largely rural, have large numbers of ethnic minorities and people living below the poverty level, and the investigative team has developed strong ties in these communities. Both of these study counties are classified as rural, using the structural operationalization of Butler and Beale[12] that considers population size and location relative to a metropolitan area to place all US counties on a continuum of rurality from 9 for the most rural to 0 for least rural. At the time of the data collection, 1 county was classified as rural-nonmetropolitan with a Beale code of 6, and the other rural-nonmetropolitan with a Beale code of 4.[13] While each county is primarily rural and has large areas of open country, there are small towns in each, and there is a small city in one. Each is adjacent to a metropolitan area. These counties share many similarities to other rural areas, particularly in the South. A majority of the older residents are life-long residents of the county, strong conservative religious beliefs are widely held, and the counties have experienced the economic effects caused by loss of industries and jobs.

The study began in 2001, with recruitment of participants conducted from May to October 2002. The study was approved by the Institutional Review Board of the Wake Forest University School of Medicine.

Participant Recruitment and Selection

The overall goal of the study was to recruit a representative sample of community-dwelling older adults with type 2 diabetes in the 2 study counties, with equal representation from African American, Native American, and white men and women. First, a sampling frame was selected using Medicare claims records from the Center for Medicare and Medicaid Services (CMS). Consideration for the sampling frame was established based on a person living in the study counties and having at least 2 outpatient claims for diabetes (ICD-9 250) in 1998–2000. From each gender-ethnic group in the sampling frame, a random sample was selected and contacted through letters from CMS and from the study team to solicit participation in the survey. The letters were followed up with a phone call or personal home visit from the study team to confirm diabetes status and further assess eligibility (resident of study counties, age ≥65, English speaking, member of 1 of the 3 targeted ethnic groups, physically and mentally able to participate in survey) and willingness to participate in the study.

Of the 1,222 people who were contacted, 313 were disqualified for the following reasons: reported that they did not have diabetes (n = 118); lived out of study counties (n = 51); lived in a nursing home (n = 84); age not ≥65 years (n = 2); did not speak English (n = 1); failed Mini-Mental State Exam (n = 5); deceased (n = 52). We were unable to assess the eligibility of an additional 122 people for the following reasons: refused participation and screening (n = 48); physically (n = 8) or mentally (n = 14) unable to participate in screening; unable to locate (n = 52). Of those who met the eligibility criteria after the telephone or in-person contact, 86 were not interviewed for the following reasons: refused participation (n = 74); study staff determined that the participant was physically (n = 6) or mentally (n = 6) unable to participate. The final sample included 701 individuals who completed the survey. Thus, the overall response rate among participants known to be eligible was 89%.

For these analyses the sample size was reduced from 701 to 698 (Tables 1 and 2) and further to 667 for the logistic regressions (Table 3). The first reduction was due to an exclusion of 3 participants who did not fit the 3 ethnic categories, bringing the sample size to 698. The second reduction to 667 observations was due largely to missing values in the income variable. We combined information on Medicaid and income into one variable to create a poverty status variable, which was missing in cases where Medicaid was ‘‘no’’ and income was missing. This resulted in 30 observations being eliminated from the analyses. The last observation was eliminated due to a missing value for the education variable. Our indicator of ‘‘high school or equivalent’’ was based on the overall education variable, so the missing value on the latter resulted in a missing value on the former.

Study Measures

Face-to-face interviews were conducted by local, trained interviewers. Participation in the study involved a 1-hour survey. Survey data were recorded on paper forms, data-entered into EpiInfo (version 6.0, CDC, Atlanta, Ga), and analyzed using SAS Statistical Software (version 8.2, SAS Institute, Inc., Cary, NC). The survey instrument included well-established standardized questionnaires, as well as questionnaires developed and pilot-tested by the investigators. Measures used in this report include: gender, self-identified ethnicity, age, marital status, highest level of formal education, annual household income, supplemental insurance, Medicaid status, number of people living in the home, duration of diabetes, current use of diabetes medications, total number of prescription medications, history of diabetes-related complications (heart disease, stroke, thrombosis in legs, kidney disease, eye disease, extremity amputation, and neuropathy) and self-rated health.

Relevant to the primary aim of this analysis, participants were asked whether: (1) they had a regular doctor or clinic for their primary health care, (2) whether they had seen their doctor for any reason, for a regular checkup, and for their diabetes in the past year, and (3) whether they had seen any of the following specialists in the past year: nutritionist, diabetes specialist (endocrinologist), eye doctor (ophthalmologist or optometrist), bladder or urinary tract specialist (urologist), kidney specialist (nephrologist), heart specialist (cardiologist), foot specialist (podiatrist). We used phrases that focused on the function of the provider (eg, ‘‘eye doctor’’) because we were concerned that some participants might not recognize the more technical names for these specialists. Interviewers were instructed to initially use the less technical term in the questions and the more technical term if deemed necessary. For the purposes of this paper, these terms are used interchangeably. For each participant, the number of specialists seen in the past year was tallied and an average for the sample was computed. In the specific case of foot specialist (podiatrist), there was a further reduction in sample size due to the presence of double-amputees among the participants. This resulted in a regression sample size of 660 for foot specialist in Table 3, and sample sizes of 114, 103, 87, 92, 148, 146, in that order, for foot specialist in the columns of Table 2.

Statistical Analysis

Demographic and health characteristics and health care utilization were summarized using counts and percentages, or means and standard deviations. Associations between health care utilization outcome measures and independent variables were evaluated for statistical significance using regression modeling. Multiple logistic regression models were used to evaluate potential predictors of primary and specialty health care provider use. Poisson multiple regression models were used to evaluate potential predictors of number of specialty care providers seen. Significance tests were performed for gender × ethnicity interactions, controlling for gender, ethnicity, marital status, level of education, economic status, diabetes medication group, age group, and self-rated health. If a gender × ethnicity term was significant ($P \leq .05$), then significance tests were performed among the 3 ethnic groups for all pairwise comparisons of odds ratios for practitioner use in females vs males. If a gender × ethnicity term was nonsignificant, then the interaction term was dropped from the model and significance tests were performed for main effects of gender and ethnicity. If an ethnicity term was significant, then significance tests were performed for all pairwise comparisons among the 3 ethnic groups. Pairwise comparison results were evaluated using Bonferroni’s method. Outcomes with provider use reported at greater than 96% among participants were excluded from all regression analyses.

Results

Demographic and general health characteristics of the sample are presented in Table 1. The majority of the sample had less than a high school education (65.1%) and had a household income less than $15,000 (57.3%), reflecting the high rates of poverty in these communities. The majority had some form of supplemental insurance, had at least 2 people living in the home, and were taking an oral medication to treat their diabetes. On average, participants reported having been diagnosed with diabetes for about 12 years. The mean body mass index calculated from self-reported height and weight was 29.6 kg/m^2, which is close to the classification for obesity (30 kg/m^2). High rates (>20%) of diabetes-related complications were reported for heart disease, stroke, eye disease, and neuropathy.

Table 2 presents the proportion, overall and by gender/ethnic groups, of participants who reported utilizing primary and specific specialty care providers and the average number of specialty care providers utilized in the past year. Virtually all participants in the sample reported having a primary care doctor or clinic where they received care. Similarly, there was near unanimity in having seen a doctor for any reason in the past year, and 96.7% reported that they had had a regular checkup in the past year. Overall, 42.4% reported having been to the doctor in the past year for diabetes-related care, ranging from 36.5% for white women to 54.8% for African American men.

The average number of specialists seen in the past year was 1.9 (± 1.3 SD). About 54% of participants reported having seen more than one of these specialists in the past year, with the most common being an eye doctor (72.4%), and the least commonly utilized specialists being nutritionists (10.9%) and endocrinologists (5.7%).

Table 3 presents adjusted odds ratios for gender and ethnic effects on health care utilization adjusted for marital status, level of education, poverty status, diabetes medication group, age group, and self-rated health. Only 1 significant ethnic effect was observed: African Americans were more likely than Native Americans and whites to report utilizing a podiatrist. Significant gender effects were observed for 3 specialists (bladder specialist, P =.02; kidney specialist, P =<.001; and heart specialist, P =.01), with men being more likely than women to utilize each of these specialists. No significant gender × ethnicity interactions were observed.

To determine whether these gender differences were influenced by differences in self-reported rates of chronic conditions associated with these specialists, the analyses were repeated adding self-reported complications into each model when available. A history of diabetic nephropathy added to the model predicting utilization of kidney specialists was highly significant (OR = 7.8; 95% Confidence Interval: 4.5,13.7), but did not affect the independent gender effect. A similar pattern was observed for utilization of a cardiologist when self-reported history of heart disease was included in the model.

The multiple regression model (Table 4) indicated several significant associations for the number of specialists seen. Adjusting for other covariates in the model, higher rates of specialist use were observed for: men vs women; people with at least a high school education vs those without a high school education; receiving Medicaid vs not receiving Medicaid and having an annual income<$25,000; those taking insulin vs those taking only oral agents or those taking no diabetes medications; and those reporting the lowest self-rated health vs those reporting higher self-rated health. To eliminate the potential influence of gender differences in utilization of urologists, the models were repeated without that specialist. All of the above effects remained significant, albeit the relationships were generally attenuated (data not shown).

Discussion

Medical management is essential to reducing the devastating effects of diabetes. This management is optimized in a setting that includes primary as well as specialty care providers.[6] Utilization of these providers may be limited in rural areas and in populations with limited income.[10,11]

While much is known about the processes of care among patients with diabetes (eg, number of patients meeting recommendations for glycosylated hemoglobin measurement), less is known about utilization of primary care providers among people with diabetes, and even less is known about the utilization of specialty care providers. In the present study of a rural, ethnically diverse population of older adults with diabetes, very high rates of primary care utilization (>95%) were observed, which is consistent with data from other studies.[14,15] These data also show relatively low rates of utilization of most of the relevant specialty care providers. The exception was utilization of an ‘‘eye doctor’’ (72.4%). Respondents could have included an optometrist, an ophthalmologist, or both in their response. Though a dilated eye examination is a critical element to early detection of diabetic retinopathy, we did not ask ELDER participants specifically whether this utilization resulted in a dilated eye examination. Harris, using NHANES III data,[14] showed that about half of adults with type 2 diabetes in that sample had had a dilated eye examination in the past year.

The vast majority of this sample indicated some contact with a provider in the past year, although less than half reported this contact was for diabetes-related care. It is likely that many of the processes of care that are provided in primary care settings (eg, blood pressure and cholesterol measurement, and HbA1c measurement) are not considered diabetes-related care visits by patients. Nonetheless, these data indicate primary providers are an essential component of diabetes management in rural communities.

Few ethnic differences were observed in health care utilization in this sample after controlling for other factors. African Americans were more likely than Native Americans and whites to utilize a podiatrist in the past year, a finding which may reflect a reaction by health care providers to the increased risk of lower-extremity amputation among African Americans compared to whites.[16,17] Behavioral Risk Factor Surveillance (BRFS) and National Health Interview Survey (NHIS) data have also shown that African Americans are as likely[18] or more likely[17] than whites to report having had a foot examination in the past year. BRFS data did not indicate whether this examination was conducted by a podiatrist. NHIS data showed rates of approximately 20% of adults ≥18 years of age reporting having visited a podiatrist in the past year, which did not vary by ethnicity, but a significantly greater proportion of African Americans (37.8%) in this study indicated that a health professional had checked their feet in the past 6 months compared to Mexican Americans (29.0%) and non-Hispanic whites (29.0%). This study also showed no ethnic difference in visits to a cardiologist or ophthalmologist.[19]

This lack of an association between ethnicity and diabetes-related care is in stark contrast to the numerous studies that have shown disparities in diabetes-related medical care processes (eg, HbA1c, cholesterol, blood pressure measurement) and outcomes (eg, glycemic, LDL-cholesterol, and blood pressure control). As an example, Heisler and colleagues[9] recently showed that African Americans being served in the Veteran's Administration (VA) system were less likely than whites to have an LDL-cholesterol test in the past 2 years, and more likely to have poor cholesterol control (LDL <130 mg/dL) and blood pressure control (BP<140/90 mmHg). Similarly, Harris[8] showed that African Americans and Mexican Americans with type 2 diabetes were less likely to have their cholesterol checked and were more likely to have undiagnosed dyslipidemia.

These data show that the more relevant predictors of specialty care utilization in rural populations are gender, socioeconomic status, education, diabetes medication use, and self-rated health. These factors reflect an increased risk of complications due to poor management and increased access to specialists among those with greater means. The predominance of care provided to rural older adults with diabetes by primary care providers is an important implication of this study for clinical practice. For a variety of reasons, few specialists other than family practitioners choose to practice in rural communities.[20,21] Therefore, utilization of specialty care by those with diabetes often requires significant travel for those who live in rural communities. This constraint affects all ethnic groups in these rural counties and may account for the lack of differences found in the present study among ethnic groups in the use of specialty care. It is also possible that the SES and educational differences in specialist use may reflect the primary care providers' sensitivity in not overburdening patients with limited resources by referring these patients to specialists, and/or a perception by these providers that these patients may be less likely to take advantage of regimens provided by specialists. Thus, it is extremely important that generalist providers in rural communities develop practice standards for diabetes care and be aware that they are the major source of care for their patients with diabetes.

This study has a number of strengths, including the rural, ethnically diverse sample, the use of an extensive questionnaire on health care utilization and predictor variables, the large sample size, and the high response rate. A limitation of this study involves reliance on self-report of health care utilization. It is possible that a number of participants in this study did not recognize the terminology we used for specialty care providers. However, this is unlikely. In this rural area, specialists are usually housed in settings separate from primary care providers, and using a specialist requires travel. We used terms focusing on the function of the provider to assist participants in recalling their utilization of these providers. We also did not ask whether visits to the primary care provider were for treatment of a specific condition or for preventive purposes. Our data seem to indicate that the purpose may be for treatment or prevention. For example, 56.9% of our sample who reported having had some form of heart disease also reported seeing a heart specialist in the past year, and a similar proportion (57.7%) of those with some form of kidney disease reported seeing a kidney specialist. In contrast, only 28.9% of patients who reported some complication of the lower extremities reported seeing a podiatrist in the past year (data not shown). Further research is needed to more closely examine the utilization of specialists and whether this utilization is for prevention or treatment. Another limitation of this study is that the Native Americans represented in this study are not eligible for Indian Health Service health care, which limits the generalizability of this data to federally recognized tribes in the U.S. However, these data represent the few studies which are available to examine ethnic variations in health status and health care for Native Americans living in the same geographic region as other ethnic groups, which limits the potential for geographic confounding.

Conclusions

In summary, these data show a high rate of utilization of primary health care providers, and relatively low rates of utilization of specialty care providers, in an ethnically diverse sample of rural older adults with diabetes. These data do not indicate the level of care provided in primary care settings in these areas, but they do indicate that this point of care is very important for diabetes management and prevention of diabetes complications. Efforts should be made to ensure that primary care providers in rural areas are adhering to clinical recommendations to enhance diabetes management. While less that half of participants indicated that they had been to the doctor for ‘‘diabetes-related care,’’ in the past year, it is likely that many of the elements of care related to diabetes (eg, blood pressure and cholesterol management) that generally occur in primary care settings are not recognized by diabetes patients as diabetes-related care. Further examination also needs to focus on the relative impact of specialty-care utilization on diabetes-related outcomes in this population and on means by which the barriers to access to high-quality care can be minimized.

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Table 1

Demographic and Health Characteristics of ELDER Participants, Overall

	Overall (N = 698, Except Where Specified Otherwise) Count (%) or Mean ± SD
Demographic	
Ethnicity	
African American	220 (31.5)
White	297 (42.6)
Native American	181 (25.9)
Female	343 (49.1)
Age (y)	74.1 ± 5.42
Married	350 (50.1)
Formal education N = 697	
≤8th grade	284 (40.8)
9th grade to 11th grade (some high school)	169 (24.3)
High school diploma/GED	145 (20.8)
At least some college	99 (14.2)
Annual household income N = 640	
≤$10,000	230 (35.9)
≥$10,000 to ≤$15,000	137 (21.4)
≥$15,000 to ≤$25,000	133 (20.8)
≥$25,000	140 (21.9)
Supplemental insurance	
VA, Medicare Part B, HMO, Other	639 (91.6)
Poverty status N = 668	
On Medicaid	236 (35.3)
No Medicaid & income <$25,000	304 (45.5)
No Medicaid & income ≥$25,000	128 (19.2)
Number of people in home	
1	214 (30.7)
2	340 (48.7)
3 or more	144 (20.6)
Health	
Diabetes duration (y)	12.4 ± 10.97
HbA1c (%) N = 693	6.8 ± 1.32
Diabetes medication	
No medication	86 (12.3)
Oral agent only	420 (60.2)
Insulin with or without oral agents	192 (27.5)
Self-rated health	
Excellent, very good, or good	315 (45.1)
Fair or poor	383 (54.9)
Number of prescription medications N = 693	6.5 ± 4.23
Diabetes-related chronic health conditions	
Heart disease	318 (45.6)
Stroke	177 (25.4)
Thrombosis/blood clots in legs	58 (8.3)
Kidney disease	78 (11.2)
Eye disease	282 (40.4)
Extremity amputation	20 (2.9)
Neuropathy	158 (22.6)

Table 2

Proportion of ELDER Participants Who Have Utilized Primary and Specialty Health Care Providers, Overall and by Gender/Ethnicity

	African Americans		Native Americans		Whites		All
	Men (n = 117*†)	Women (n = 103†)	Men (n = 89*†)	Women (n = 92*)	Men (n = 149*†)	Women (n = 148*)	(N = 698*†)
Does participant have a primary care doctor	99.2	100.0	96.6	98.9	99.3	100.0	99.1%
Has participant been to the doctor for any reason in the past year	97.4	99.0	98.9	100.0	99.3	98.7	98.9%
Has participant been to the doctor for diabetes-related care†	54.8	46.1	37.5	40.2	40.5	36.5	42.4%
Has participant been to the doctor for regular checkup†	99.1	97.1	97.7	95.7	96.0	95.3	96.7%
Has participant been to the following specialist							
Nutritionist	13.7	15.5	16.9	7.6	5.4	9.5	10.9%
Diabetes Specialist	7.7	6.8	3.4	3.3	3.4	8.8	5.7%
Eye Doctor	73.5	76.7	65.2	73.9	73.8	70.3	72.4%
Bladder/UI Specialist	20.5	19.4	34.8	17.4	25.5	17.6	22.2%
Kidney Specialist	23.9	14.6	28.1	14.1	18.8	8.8	17.5%
Heart Specialist	31.6	27.2	47.2	27.2	38.3	32.4	34.0%
Foot Specialist*	31.6	39.8	23.0	18.5	19.6	21.2	25.2%
Has participant seen:							
More than one specialist	55.6	63.1	66.3	41.3	60.4	42.6	54.4%
Total number of specialists	2.0 ± 1.4	2.0 ± 1.3	2.2 ± 1.5	1.6 ± 1.1	1.8 ± 1.2	1.7 ± 1.3	1.9 ± 1.3

*Results on foot specialists are based on the following sample sizes: 114 and 103 for African American men and women, 87 and 92 Native American men and women, 148 and 146 white men and women, respectively, and a total of 690.

†Results for these questions are based on the following sample sizes: 115 and 102 for African American men and women, 88 and 92 for Native American men and women, 148 and 148 for white men and women, respectively, and a total of 693.

Table 3

Multiple Logistic Regression Results for Primary and Specialty Health Care Provider Use* (N = 667 Except Where Noted)

Medical Care Provider Outcome	Estimated Odds Ratio (95% Confidence Interval) White Reference:Male	White Female	African American Male	African American Female	Native American Male	Native American Female	Contrast†	*P* Value
Has participant been to the doctor for diabetes-related care N = 662	1.0	0.9 (0.5, 1.6)	1.4 (0.8, 2.5)	1.1 (0.6, 2.1)	0.8 (0.5, 1.5)	0.8 (0.4, 1.5)	Gender	.53
							Ethnicity	.13
Has participant been to the doctor for regular checkup N = 662	1.0	0.8 (0.2, 3.1)	3.5 (0.4, 31.7)	1.1 (0.2, 6.6)	1.3 (0.2, 7.3)	0.5 (0.1, 2.1)	Gender	.24
							Ethnicity	.44
Has participant been to the following specialists								
Nutritionist	1.0	1.4 (0.5, 3.8)	2.8 (1.1, 7.2)	2.5 (0.9, 7.0)	3.1 (1.2, 8.1)	1.3 (0.4, 4.1)	Gender	.51
							Ethnicity	.06
Diabetes Specialist	1.0	4.0 (1.3, 12.5)	3.7 (1.1, 12.2)	3.7 (0.9, 15.4)	1.3 (0.3, 6.2)	2.0 (0.4, 9.9)	Gender	.07
							Ethnicity	.17
Eye Doctor	1.0	0.7 (0.4, 1.3)	1.2 (0.7, 2.2)	1.0 (0.5, 1.9)	0.8 (0.4, 1.5)	1.0 (0.5, 2.0)	Gender	.47
							Ethnicity	.52
Bladder/UI Specialist	1.0	0.5 (0.3, 1.0)	0.7 (0.3, 1.2)	0.6 (0.3, 1.3)	1.3 (0.7, 2.4)	0.6 (0.3, 1.2)	Gender	.02
							Ethnicity	.42
Kidney Specialist	1.0	0.4 (0.2, 0.9)	1.1 (0.6, 2.2)	0.6 (0.3, 1.3)	1.3 (0.7, 2.6)	0.5 (0.2, 1.2)	Gender	<.001
							Ethnicity	.65
Heart Specialist	1.0	0.7 (0.4, 1.2)	0.6 (0.4, 1.1)	0.4 (0.2, 0.8)	1.1 (0.6, 2.0)	0.4 (0.2, 0.8)	Gender	.01
							Ethnicity	.07
Foot Specialist N = 660	1.0	0.9 (0.5, 1.6)	1.8 (1.0, 3.4)	2.0 (1.0, 3.9)	1.3 (0.6, 2.6)	0.7 (0.3, 1.5)	Gender	.38
							Ethnicity	<.01
							White v AA	<.01
							White v NA	.99
							AA v NA	<.01

* All estimates and *P* values are controlled for other variables in the model: marital status, level of education, combined Medicaid status and household income, diabetes medication group, age group, and self-rated health.

† Significance tests were first performed for gender × ethnicity, controlling for all other variables in the model, including gender and ethnicity. If the gender × ethnicity interaction term was nonsignificant (*P*>.05), then the interaction term was dropped from the model, and separate tests were performed for gender and ethnicity. If ethnicity was significant (*P*≤.05), then significance tests were performed for all pairwise comparisons among the 3 ethnic groups.

Table 4

Multiple Regression Model for Demographic and Health-related Predictors of Number of Specialty Care Providers Seen (N = 667)

Variable	Chi-Square	*P* value
Gender	8.64	<.01
Ethnicity	1.78	.41
Marital status	1.59	.21
Education	10.89	<.01
Poverty status	11.11	<.01
On Medicaid vs no Medicaid and income ≥$25,000	0.44	.51
No Medicaid and income <$25,000 vs no Medicaid and income ≥$25,000	3.26	.07
On Medicaid vs no Medicaid and income<$25,000	9.59	<.01
Diabetes medication use	17.89	<.001
No medication vs oral medications	0.25	.62
Insulin vs no medications	9.05	<.01
Insulin vs oral medications only	16.21	<.0001
Age group	0.03	.99
Self-rated health	9.65	<.01