Racial and Ethnic Variation in Access to Health Care, Provision of Health Care Services, and Ratings of Health Among Women With Histories of Gestational Diabetes Mellitus

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OBJECTIVE — The purpose of this study was to assess racial/ethnic variation in access to health care, use of particular health care services, presence of cardiovascular risk factors, and perceptions of health and impairment among women at risk for type 2 diabetes because of their histories of gestational diabetes mellitus (hGDM).

RESEARCH DESIGN AND METHODS — We performed a cross-sectional study using the 2001–2003 Behavioral Risk Factor Surveillance System, a national, population-based, random sample telephone survey. We assessed access to health care, use of family planning, measurement and elevation of cholesterol, elevation of blood pressure, and respondents' perceptions of health and impairment among women aged 18–44 years with hGDM ($n = 4,718$). Multivariate models adjusted for sociodemographic characteristics, BMI, presence of children in the household, and current smoking.

RESULTS — Outcome measures were suboptimal across racial/ethnic groups. Approximately one-fifth of the overall population reported no health insurance, cost barriers to physician visits, and no primary care provider. One-quarter had no examination within the past year, and almost one-fifth reported no family planning and elevated cholesterol levels. Latinas were the most disadvantaged, with 40% reporting no health insurance and no primary care provider and one-fourth reporting suboptimal perceptions of health. Asian/Pacific Islanders were the most advantaged in terms of health care access, cholesterol and blood pressure elevation, and impaired physical health. Racial/ethnic differences in health care use and presence of risk factors were not entirely explained by health care access or other covariates.

CONCLUSIONS — Significant racial/ethnic variation exists among women with hGDM for access to and use of health care, presence of risk factors, and perceptions of health.

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S uccessful translation of diabetes prevention trials (1–3) into clinical practice requires that health care providers monitor health status, provide and reinforce prevention messages, and refer patients to available prevention programs (4). For most women with histories of gestational diabetes mellitus (hGDM), one of the recruitment criteria for the Diabetes Prevention Program (5), appropriate care also includes use of family planning (4) and cardiovascular risk factor assessment, i.e., cholesterol and blood pressure measurement (6,7). However, women with hGDM may have inadequate access to health care outside of pregnancy; some insurers and Medicaid limit postdelivery coverage to one visit, at about 6 weeks postpartum, regardless of health or disease status (8,9). Previous studies (10) suggested that this lack of access may be more marked in nonwhite racial/ethnic groups. In the third National Health and Nutrition Examination Survey, Mexican Americans were significantly less likely to have health insurance than non-Hispanic whites (NHWs) or African Americans, and Mexican Americans and African Americans were less likely to have private insurance. No studies have investigated racial/ethnic variation in access to health care nor its association with the provision of appropriate health care services to women with hGDM.

In our previous study using the Behavioral Risk Factor Surveillance System Survey (BRFSS), a national, population-based survey, we found that women with hGDM more often rated their health as fair or poor than did their unaffected counterparts (11). This perception of health may be more sensitive to distinctions between racial/ethnic groups than traditional markers of morbidity and mortality (12), particularly for women with hGDM, who have a greater risk than unaffected women for developing future chronic disease (13), but who may have normal glucose after delivery. However, to our knowledge, no studies have investigated racial/ethnic variation in perceptions of health and impairment among women with hGDM.

In this article, we investigated racial/ethnic variation in access to health care, provision of health care regarding use of family planning and cholesterol measurement, presence of cardiovascular risk factors such as elevated cholesterol and blood pressure, and perceptions of health and impairment among women with hGDM in the BRFSS. We hypothesized

that minority women, particularly Latinas, would report decreased access, decreased family planning practices and cholesterol screening, and poorer perceptions of health and degree of impairment compared with NHW women. We also hypothesized that race/ethnicity would be independently associated with access measures, decreased use of family planning, cholesterol screening, elevated cholesterol and blood pressure, and perceptions of health and degree of impairment after adjustment for other demographic characteristics.

RESEARCH DESIGN AND METHODS

— We used data from the 2001–2003 waves of the BRFSS. This cross-sectional telephone survey is conducted by the Centers for Disease Control and Prevention in conjunction with state health departments. The survey uses a multistage cluster design based on random-digit dialing methods of sampling to select a representative sample from each state's noninstitutionalized civilian residents aged ≥18 years. Data collected from each state are pooled to produce nationally representative estimates. This study used responses to a core set of questions asked in all states. Median response rates varied from 77 to 80% over the study period (14). A detailed description of the survey methods has been published previously (11,15). The sample included women aged 18–44 years who answered the 2001–2003 survey question "Have you ever been told by a doctor that you have diabetes?" Responses included "yes," "yes but only during pregnancy," "no," and "don't know" or "not sure." Participants who first answered "yes" were further asked "was this only when you were pregnant?" Women who responded "yes" and "only during pregnancy" were classified as having hGDM, and women who responded "yes" were classified as having current diabetes. Participants who responded "no" were classified as not having hGDM, and women who responded "don't know" or "not sure" were classified as such. Thus, the categories of hGDM and diabetes were mutually exclusive. We excluded women who reported current diabetes from this analysis ($n = 4,412$), and women who replied "don't know, not sure, or refused" ($n = 132$), for a sample size of 4,718. Five studies have reported high overall reliability of the BRFSS question about a diagnosis of diabetes (κ 0.60–0.86) (15); to our knowledge, no studies reported the validation of the gestational diabetes component.

Main outcome measures

Access to health care was measured by questions inquiring about lack of health insurance, the presence of cost barriers to physician visits in the past year, lack of a primary care provider, location of primary health care facility (no usual place of care or primary source of care in emergency room or urgent care facility versus doctor's office, outpatient department, public health clinic, or community center), and lack of a physical examination within the past year. Questions on cost barriers, location of primary care facility, and physical examination were only asked in 2003, 2002, and 2001, respectively.

Family planning questions included the question "Are you or your partner doing anything now to keep from getting pregnant?" and was asked only in 2002; however, no questions inquired about the desire for pregnancy. Women were classified as not using family planning if they did not use birth control. Women could also be classified as using birth control, being sterile, or lacking contact with men. Respondents were also asked, "Have you ever had your blood cholesterol checked?" If they answered "yes," they were asked, "Have you ever been told by a doctor, nurse, or other health care professional that your blood cholesterol is high?" These questions were asked only in 2001 and 2003.

Responses to perceptions of health were excellent, very good, good, fair, and poor (16). Impaired physical health was defined as the presence of physical health problems, including physical illness or injury, that prevented work or recreation on ≥15 days during the past 30 days (17). Impaired mental health was defined as the presence of mental health problems, including stress, depression, and problems with emotions, that prevented work or recreation on ≥15 days during the past 30 days (17). Impaired mental and physical health questions were asked in 2001 and 2003 only. These measures have moderate to strong retest reliability (18).

Analysis

The primary independent variable was self-reported race/ethnicity (NHW, non-Hispanic African American, Hispanic or Latina, Asian/Pacific Islander [A/PI], Native American/Native Alaskan [NA/AN], or other). Covariates included age (years), education level (less than high school, high school, and greater than high school), income level, current employment, married or partnered status, presence of children aged <18 years in the household, BMI (measured as weight in kilograms divided by the square of height in meters), and current smoking. Reliability coefficients exceeded 0.75 for these covariates and moderate to high validity except where otherwise noted. Validity of these measures is high (15); height is generally overestimated by an average of 0.5 inches, and in the BRFSS the correlation between measured height and self-reported height was 0.92 in women. Similarly, weight is generally underestimated, and in the BRFSS the correlation between measured weight and self-reported weight exceeded 0.90 (15). We collapsed educational level into high school graduate or not and income into <$25,000, ≥$25,000, and unknown income as the patterns of effects between race/ethnic groups were similar in these categories. We classified women into obese (≥30 kg/m²), overweight (25–<30 kg/m²), normal or underweight (<25 kg/m²), and unknown.

We compared women with hGDM by race/ethnicity in unadjusted analyses using Rao-Scott χ^2 tests for categorical variables (19) and Student's *t* tests with survey-based standard errors for continuous variables; the reference group was NHWs. To examine the association between the dependent variables of access to health care measures and the primary independent variable of race, we created a logistic regression model in which each access to health care measure (lack of insurance, cost barriers to care, lack of primary care provider, and lack of performance of physical examination within the past year) was examined in a separate model. Multivariate models adjusted for the covariates listed above. BMI was included as a covariate because greater BMI has been associated with lower rates of insurance in other BRFSS analyses, presumably because insurers may be reluctant to insure those with this medical risk factor (20).

To examine the association between the outcome measures of lack of use of family planning, lack of cholesterol screening, elevated cholesterol, and elevated blood pressure and the primary independent variable of race/ethnicity, we created logistic regression models for each of these measures. That is, one model had lack of family planning as the dependent variable, another model had

lack of cholesterol measurement as the dependent variable, a third model had elevated cholesterol as the dependent variable, and a fourth model had family planning as the dependent variable. We hypothesized that these measures would be influenced by access to health care, in that they required or could be enabled by physician examination (e.g., blood pressure elevation), laboratory test ordering (e.g., cholesterol checked), or prescription (e.g., family planning usage). Therefore, multivariate models examining family planning, cholesterol screening, and blood pressure elevation also included lack of insurance and lack of a primary care provider as well as other covariates (21). Multivariate models with elevated cholesterol as the dependent variable included only women who reported having a cholesterol level measured.

To examine the association between the dependent variables of perceptions of health and impairment and the primary independent variable of race/ethnicity, we created logistic regression models similar to those already described for which the outcomes were fair or poor health (yes or no), impaired physical health (yes or no), and impaired mental health (yes or no). These models did not include access measures as covariates, as we did not hypothesize that self-rated health and impairment were dependent on health care (10).

We evaluated the interactions between age and race/ethnicity for all models. These were not significant and therefore were not included in the final models. Tests for collinearity between these access measures did not show significant correlation. In all comparisons, the data were weighted to the age, sex, and racial/ethnic distribution of the non-institutionalized population in the U.S. All analyses were performed using survey analysis procedures in SAS (version 9.1; SAS Institute, Cary, NC) to account for the weighting and complex survey design.

RESULTS — Of the 4,718 participants with hGDM, 58% were NHW, 9% were African American, 5% were A/PI, 2% were NA/AN, 25% were Latina, and 1% were other race/ethnicity. Unadjusted characteristics of women with hGDM by racial/ethnic category are reported in Table 1; point estimates and 95% CIs are presented to facilitate comparisons. Compared with NHWs with hGDM, African Americans with hGDM were younger and more likely to have annual incomes

Table 1—Unadjusted characteristics of women with a history of GDM by race/ethnicity

Characteristic	NHW	African American	Hispanic or Latina	NA/AN	A/PI	Total
n	3,305	389	596	150	203	4,718
Age (years)	33.4 (33.1–33.8)	**31.3 (30.0–32.6)**	32.9 (32.0–33.7)	**31.8 (31.2–32.4)**	**35.9 (35.3–36.6)**	33.2 (32.9–33.5)
High school graduate (%)	93.5 (92.3–94.8)	92.1 (88.7–95.5)	78.9 (64.6–93.2)	96.0 (91.3–100.0)		84.2 (82.1–86.4)
Income >$25,000 (%)	71.3 (69.0–73.7)	**46.8 (37.9–55.6)**	**38.1 (31.6–44.5)**	57.3 (42.9–71.7)	**56.0 (47.0–65.0)**	59.4 (57.0–61.9)
Currently employed (%)	65.2 (62.7–67.7)	60.6 (51.2–70.0)	**49.0 (42.5–55.6)**	60.8 (46.1–75.5)	**40.4 (30.5–50.3)**	59.3 (56.9–61.7)
Married or partnered (%)	76.9 (74.7–79.0)	**44.5 (35.8–53.3)**	82.3 (78.3–86.3)	63.1 (48.1–78.1)	**67.0 (59.8–74.1)**	74.2 (72.2–76.2)
Children aged <18 years in house (%)	86.7 (85.0–88.4)	85.9 (77.0–94.9)	**96.3 (94.5–98.1)**	75.8 (59.3–92.3)	91.3 (85.8–96.8)	88.9 (87.5–90.4)
BMI (kg/m²)	26.7 (26.4–27.0)	**30.4 (28.7–32.1)**	**28.5 (27.6–29.4)**	**29.1 (28.7–29.4)**	**25.3 (24.4–26.1)**	27.4 (27.1–27.8)
Current smoker (%)	30.3 (27.8–32.7)	**19.7 (12.7–26.7)**	**10.5 (7.0–13.9)**	27.8 (16.8–38.8)	**11.7 (4.7–18.7)**	23.3 (21.4–25.2)
No health insurance (%)	14.7 (12.8–16.7)	19.2 (10.2–28.3)	**38.1 (31.7–44.4)**	24.1 (10.5–37.7)	**6.1 (1.3–11.0)**	20.7 (18.5–22.9)
Did not see a doctor because of cost during past year (%)*	17.2 (13.5–20.8)	23.4 (12.9–33.9)	27.3 (16.0–38.7)	18.6 (4.4–32.9)	**6.4 (0.0–12.9)**	19.6 (15.8–23.4)
No primary provider (%)	14.7 (12.8–16.7)	18.2 (9.0–27.3)	**37.3 (30.8–43.8)**	22.4 (10.1–34.6)	**34.4 (26.7–42.2)**	21.7 (19.6–24.0)
Primary health care facility is urgent care or emergency facility (%)†	13.9 (10.5–17.3)	30.5 (14.2–46.9)	20.5 (11.4–29.6)	20.0 (0.8–39.1)	14.5 (0–31.6)	17.1 (13.4–20.9)
Physical examination >1 year ago (%)‡	25.7 (21.3–30.1)	19.0 (9.2–28.8)	33.4 (22.4–44.4)	34.7 (0.7–68.8)	**3.1 (0.0–7.9)**	26.5 (22.3–30.7)

Data are means or percentages (95% CI). Bold font indicates significant differences from NHWs. *Denominator includes 2003 respondents only. †Denominator includes 2002 respondents only. ‡Denominator includes 2000 respondents only.

Table 2—*Adjusted associations between racial/ethnic groups and access to health care measures*

Characteristic	African American	Hispanic or Latina	NA/AN	A/PI
n	389	596	150	203
Access measures*				
No health insurance	0.9 (0.5–1.5)	**1.8 (1.3–2.5)**	1.3 (0.7–2.6)	**0.3 (0.1–0.7)**
Did not see a doctor because of cost during past year†	1.1 (0.4–2.6)	1.5 (0.8–3.0)	1.2 (0.5–3.0)	0.3 (0.1–1.1)
No primary health care provider‡	0.9 (0.5–1.5)	**2.3 (1.6–3.3)**	1.4 (0.6–3.4)	**2.4 (1.6–3.6)**
Primary health care facility is emergency or urgent care facility§‖	**2.4 (1.1–5.0)**	1.1 (0.5–2.1)	1.5 (0.4–5.5)	1.3 (0.3–5.7)
Physical examination >1 year ago¶	0.6 (0.3–1.2)	1.3 (0.7–2.4)	1.4 (0.3–6.3)	**0.1 (<0.1–0.6)**
Service measures*				
Not using family planning§#	0.8 (0.4–1.6)	0.6 (0.3–1.2)	**3.5 (1.1–11.1)**	1.3 (0.5–3.4)
Cholesterol never checked**	0.7 (0.4–1.1)	1.3 (0.9–1.9)	0.7 (0.3–1.7)	0.7 (0.4–1.3)
Cholesterol elevated**	1.1 (0.6–1.9)	1.2 (0.5–2.7)	0.9 (0.3–3.0)	0.3 (0.1–1.0)
Blood pressure elevated**††	1.4 (0.8–2.3)	1.0 (0.6–1.8)	1.8 (0.8–4.1)	**0.1 (<0.1–0.4)**
Perceptions of health*				
Perception of health fair/poor	1.7 (1.0–3.0)	**2.0 (1.3–3.0)**	2.3 (0.9–6.1)	0.7 (0.3–1.5)
Impaired physical health**	0.9 (0.4–2.0)	0.9 (0.5–1.8)	0.7 (0.3–1.7)	**<0.1 (<0.1–0.2)**
Impaired mental health**	1.1 (0.6–2.0)	1.3 (0.7–2.3)	1.7 (0.8–3.7)	1.2 (0.4–3.5)

Data are odds ratios (95% CI). An elevated odds ratio indicates that race/ethnicity is associated with increased odds of the adverse outcome compared to NHWs. Bold text indicates significant differences from NHWs. *Models examining access measures and perceptions of health as dependent variables adjust for age, education, income, current employment, marital status, presence of children aged <18 years of age, smoking status, and BMI. Models examining service measures included these covariates, as well as lack of insurance and lack of a primary care provider. †Denominator includes only 2003 respondents. ‡No primary care provider includes only the "No" response; reference is ≥1 primary care provider. §Denominator includes only 2002 respondents. ‖Reference = doctor's office, outpatient department at hospital, community center, or public health clinic. ¶Denominator includes only 2001 respondents. #Not using birth control or unknown, reference = using birth control, sterile, not sexually active with men. **Denominator includes only 2001 and 2003 respondents. ††Reference category is "No" or "Only During Pregnancy."

<$25,000 and greater than average BMI. They were less likely to be married or partnered and to smoke. They were similarly likely to be high school graduates, employed, and to have children <18 years of age in the household. Compared with NHWs with hGDM, Latinas with hGDM were more likely to be poor, to be heavier, and to have children <18 years of age in the household. They were less likely to be high school graduates, to be currently employed, and to smoke. Compared with NHWs with hGDM, NA/ANs with hGDM were younger and were more likely to be heavier. However, in contrast with other racial/ethnic groups, A/PIs with hGDM were older and wealthier and had a lower BMI than NHWs with hGDM. A/PIs were less likely to be employed and were less often smokers than NHWs with hGDM.

Table 1 also illustrates unadjusted access to health care measures by race/ethnicity with point estimates and 95% CIs to facilitate comparisons between NHW racial/ethnic groups. Compared with NHWs, African Americans were similarly likely to report access, although CIs were wide. Compared with NHWs, Latinas were more likely to report lack of health insurance and lack of a primary care provider. Compared with NHWs, NA/ANs were also similarly likely to re-port access measures, although as with African Americans, CIs were wide. A/PIs had more access to health care than NHWs; they were less likely to report lack of health insurance or recent examination and cost barriers, although they were more likely to lack a primary care provider.

Table 1 also shows unadjusted use of services and presence of risk factors by race/ethnicity with point estimates and 95% CIs to facilitate comparisons between minority groups. Compared with NHWs, African Americans reported similar rates of family planning, cholesterol measurement and elevation, and blood pressure elevation. Compared with NHWs, Latinas actually reported using family planning more often and also reported lack of cholesterol measurement more often. Compared with NHWs, NA/ANs reported statistically similar use of services and presence of risk factors, although CIs were wide. As with access measures and other demographic characteristics, A/PIs had a more favorable profile than NHWs, reporting cholesterol elevation and blood pressure elevation less often. Latinas reported poor or fair perceptions of health more often than NHWs. A/PIs reported impaired physical health less often than NHWs as well as most women from other racial/ethnic groups (Table 1).

After multivariable adjustment, African Americans were more likely than NHWs to report that their primary location of health care consisted of an emergency room or urgent care facility and poor perceptions of health (Table 2). After multivariable adjustment, Latinas were still more likely than NHWs to report lack of health insurance and a primary care provider and poor perceptions of health. However, the associations between Hispanic ethnicity and lack of cholesterol measurement and family planning no longer persisted. After multivariate adjustment, NA/ANs were more likely than NHWs to report lack of family planning. In contrast, A/PIs were less likely than NHWs to lack health insurance, a recent physical examination, blood pressure elevation, or impaired physical health and almost less likely to have elevations in cholesterol. As in unadjusted analyses, A/PIs were still more likely to lack a primary care provider.

Table 3 illustrates the associations between the dependent variables and covariates other than race. Access measures were associated with greater income. A lack of health insurance and a lack of a recent physical examination were also associated with a lack of high school education. Current smokers were more likely to report cost barriers to physician care.

Women who had children at home were less likely to use urgent care facilities for their primary source of care. Women with children at home were more likely to report use of family planning. Younger women with lower education and incomes were less likely to have their cholesterol measured. Of the women who had their cholesterol measured, older, overweight and obese, and uninsured women were more likely to report elevations. Current smoking and obesity also predicted greater prevalence of hypertension. Greater age, lower income, current smoking, and obesity were associated with poorer perceptions of health and greater impairment.

CONCLUSIONS — In a nationally representative population-based survey of women with hGDM, we found that significant lack of access, lack of recommended services, and poor perception of health exist across all racial/ethnic groups. In this population at high risk for future diabetes and pregnancies affected by glucose intolerance, approximately one-fifth reported a lack of insurance, cost barriers to physician visits, and lack of a primary care provider. More than one-fourth reported lack of a physical examination in the past year, which in turn is a missed opportunity for glucose screening and reinforcement of family planning, diet and exercise, and other preventive measures. Almost one-fifth of women at risk for pregnancy did not use family planning. In this population at increased risk for cardiovascular risk factors, approximately one-fifth reported cholesterol elevation. Finally, in a relatively young population aged slightly >30 years, almost 15% reported poor perception of health.

We also found that significant racial/ethnic variation existed in measures of access to health care, use of services including family planning and cholesterol measurement, cholesterol and blood pressure elevation, and perception of health and degree of impairment. Such variation persisted after multivariate adjustment. With the exception of A/PIs, minority women reported less favorable profiles than NHW women. Hispanic women, the racial/ethnic group with the highest prevalence of hGDM, reported the greatest access barriers, more frequently reporting lack of health insurance and lack of a primary care provider. A/PIs reported a more favorable profile than women from other racial/ethnic groups,

Table 3—Adjusted associations between covariates other than race/ethnicity

Characteristic	Age (years >18)	< High school education*	> High school education*	Income >$25,000†	Income unknown†	Employed	Married/partnered
No health insurance	1.0 (1.0–1.0)	**1.8 (1.2–2.8)**	**0.6 (0.4–0.8)**	**0.3 (0.2–0.4)**	0.7 (0.5–1.1)	**0.7 (0.5–0.9)**	1.0 (0.7–1.4)
Did not see a doctor because of cost during past year	1.0 (1.0–1.0)	0.9 (0.4–1.9)	0.7 (0.4–1.3)	**0.4 (0.2–0.8)**	0.5 (0.2–1.1)	1.2 (0.7–2.0)	0.9 (0.5–1.6)
No primary health care provider	1.0 (1.0–1.0)	1.3 (0.8–2.0)	0.9 (0.6–1.2)	**0.4 (0.3–0.6)**	0.8 (0.5–1.2)	0.8 (0.6–1.0)	0.8 (0.6–1.1)
Primary health care facility is emergency or urgent care facility	1.0 (1.0–1.0)	1.6 (0.7–3.7)	0.7 (0.4–1.4)	**0.5 (0.2–0.9)**	0.8 (0.4–1.7)	1.2 (0.7–2.1)	1.2 (0.6–2.3)
Physical examination ≥1 year ago	1.0 (1.0–1.0)	**2.2 (1.1–4.6)**	**0.6 (0.3–0.9)**	1.1 (0.6–1.9)	1.1 (0.5–2.6)	1.1 (0.7–1.7)	0.6 (0.4–1.0)
Not using family planning	1.0 (1.0–1.0)	0.8 (0.3–1.9)	1.0 (0.6–1.5)	1.3 (0.8–2.4)	1.8 (0.9–3.6)	1.2 (0.8–1.8)	1.2 (0.7–2.1)
Cholesterol never checked	**0.9 (0.9–0.9)**	1.6 (0.9–2.7)	**0.7 (0.5–0.9)**	**0.6 (0.4–0.9)**	1.0 (0.6–1.7)	0.8 (0.6–1.1)	1.2 (0.9–1.7)
Cholesterol elevated	**1.1 (1.1–1.1)**	1.4 (0.7–3.2)	1.3 (0.7–2.3)	0.9 (0.6–1.5)	0.8 (0.4–1.7)	1.3 (0.9–1.9)	1.2 (0.8–1.9)
Blood pressure elevated	1.0 (1.0–1.1)	0.8 (0.4–1.6)	1.0 (0.6–1.5)	0.8 (0.5–1.3)	1.3 (0.6–2.7)	1.2 (0.8–1.8)	1.2 (0.7–1.8)
Perception of health fair/poor	**1.1 (1.1–1.1)**	1.5 (0.9–2.4)	0.7 (0.5–1.0)	**0.3 (0.2–0.5)**	**0.5 (0.3–0.8)**	0.8 (0.5–1.1)	0.8 (0.6–1.2)
Impaired physical health	**1.1 (1.1–1.1)**	1.0 (0.5–2.2)	0.9 (0.5–1.5)	**0.5 (0.3–0.9)**	0.7 (0.4–2.2)	0.7 (0.5–1.1)	0.8 (0.5–1.5)
Impaired mental health	1.0 (1.0–1.0)	1.0 (0.6–1.9)	1.2 (0.8–1.9)	0.7 (0.5–1.1)	0.7 (0.4–1.3)	0.7 (0.5–1.0)	0.8 (0.5–1.1)

Values are odds ratios (95% CI). Multivariate models are described in the legend to Table 2. Bold text indicates significant associations with dependent variable. *High school education is the reference category. †Income <$25,000 is the reference category.

more frequently reporting health insurance and a recent physical examination and less frequently reporting cardiovascular risk factor elevation and impaired physical health. Associations between African-American race/ethnicity and NA/AN race/ethnicity with access, use of services, presence of risk factors, and perception of health and impairment were less marked, but African-American women still were more likely to report the emergency room or urgent care facility as their primary health care facility. NA/AN women still reported lack of use of family planning more frequently than NHWs, although this lack may have been due to desire for pregnancy. Of note, the wide CIs for African Americans and NA/ANs suggest that significant variation exists within these particular racial/ethnic groups, indicating that finer characterizations may be needed.

The associations we observed between race/ethnicity and access measures and race/ethnicity and other covariates such as income have been observed in other populations besides women with hGDM. Among individuals with diabetes in the BRFSS, Gary et al. (22) found that minority populations were more likely to lack insurance and to report cost barriers to visiting a physician and having a recent examination, even after adjustment for age, sex, income, and education. Of note, the population with diabetes had better access to health care than women with hGDM in our current report, with only about one-fifth of Hispanics with diabetes reporting lack of insurance as opposed to the 38% of Latinas with hGDM in our report. Nelson et al. (23) also found that uninsured individuals with diabetes were more likely to be African American or Hispanic and to report low incomes and, consequently, to be less likely to have had diabetes-specific care measures. Of note, the more favorable profiles for A/PIs overall have been noted, but significant variation within this broad racial/ethnic category is seen; Southeast Asian groups (24) and Pacific Islanders (25) tend to do worse than NHWs as well as A/PIs overall. It is possible that such variations contribute to the higher odds of no primary care provider that we found among A/PIs.

After adjustment for lack of insurance and lack of a primary provider, along with other covariates, Latinas no longer reported lower rates of cholesterol measurement than NHWs. A/PIs reported more favorable blood pressure and cholesterol profiles than NHWs, an association that

has been reported previously (25). However, there were no associations between access measures and actual cardiovascular risk factor levels. It is possible that the number of women with cardiovascular risk factor abnormalities was too small among women with hGDM or that access in and of itself does not guarantee a better risk factor profile (26). Conflicting recommendations (7,27) for cholesterol screening in women aged <45 years may have affected associations between access and risk factor levels, although the direction of the bias is difficult to know; clinical care guidelines recommend that adults with diabetes receive cholesterol screening and do not distinguish between GDM and other types of diabetes.

Previous analyses have found that minority women were less likely to engage in family planning than NHWs, although use in NA/ANs was not commented upon (28). In our report, NA/AN women reported lack of family planning more frequently than NHW women after adjustment for access and other covariates, suggesting that some otherwise undefined characteristic associated with NA/AN race/ethnicity placed women at risk. Of note, before adjustment, Latinas actually reported greater use of birth control in our report, although this finding did not persist after adjustment for other factors. The question about family planning was available only in 2002, when interviews in Spanish were not an option. So, the results for Latinas may be biased by misinterpretation of the question or by omission of Spanish-speaking women.

We found that the association between poorer self-rated health and Latina ethnicity persisted after multivariate adjustment, as did the association between A/PI ethnicity and better physical functioning. Such associations have been documented among women with (22) and without diabetes (29,30), appear to be independent of other risk factors for lower self-rated health such as income and age, and are potentially mediated by other markers of socioeconomic position and social stressors (30–32). Again, significant variations in health status exist within the A/PI group, with subgroups, particularly Pacific Islanders and Southeast Asians, reporting poorer perception of health (24,25).

We conclude that among women with hGDM, a population at high-risk for glucose intolerance and for pregnancies at high risk for glucose intolerance, access to health care and provision of health care

are suboptimal. Latinas, one of the racial/ethnic groups at highest risk for glucose intolerance, have the greatest restrictions in access, care provided, and perception of health and impairment. In addition, although access may be a necessary condition for care, it may not be adequate to improve care. These findings have implications for the implementation of effective diabetes prevention strategies as well as other care. Future research should characterize better the quality of care women with hGDM receive and the association with outcomes. Given the rate of obesity, blood pressure and cholesterol elevations, and future risk of diabetes in this population, along with the increasing rates of these disorders in the general population, improved provision of postpartum services could potentially reduce future cardiovascular morbidity.

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