Diabetes Incidence Among Hispanic/Latino Adults in the Hispanic Community Health Study/Study of Latinos (HCHS/SOL)

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OBJECTIVE

To examine diabetes incidence in a diverse cohort of U.S. Hispanic/Latinos.

RESEARCH DESIGN AND METHODS

The Hispanic Community Health Study/Study of Latinos is a prospective cohort study with participants aged 18–74 years from four U.S. metropolitan areas. Participants were assessed for diabetes at the baseline examination (2008–2011), annually via telephone interview, and at a second examination (2014–2017).

RESULTS

A total of 11,619 participants returned for the second examination. The overall age-adjusted diabetes incidence rate was 22.1 cases/1,000 person-years. The incidence was high among those with Puerto Rican and Mexican backgrounds as well as those aged ≥45 years and with a BMI ≥30 kg/m^2. Significant differences in diabetes awareness, treatment, and health insurance coverage, but not glycemic control, were observed across Hispanic/Latino background groups, age groups, and BMI categories.

CONCLUSIONS

Differences in diabetes incidence by Hispanic/Latino background, age, and BMI suggest the susceptibility of these factors.

The prevalence of diabetes is higher among Hispanic/Latinos compared with non-Hispanic Whites (1), and the prevalence and incidence of diabetes is rising among Hispanic/Latinos since the 1980s, while the prevalence has leveled off and incidence decreased among non-Hispanic Whites (2,3). This is a cause for public health concern, as Hispanics are the largest minority group in the U.S., representing >60 million people and 18.1% of the population (4). The objective of this study is to determine the incidence of diabetes in a diverse cohort of Hispanic/Latinos in the U.S.

RESEARCH DESIGN AND METHODS

The Hispanic Community Health Study/Study of Latinos (HCHS/SOL) is an observational population study designed to assess chronic diseases and risk factors among Hispanic/Latinos (5,6). From 2008 to 2011, 16,415 participants aged 18–74 years

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were recruited across four metropolitan areas in the U.S.: Chicago, Miami, New York, and San Diego. Study participants underwent a baseline examination, and 11,619 returned for a second examination (visit 2) ~6 years later from 2014 to 2017 (5). In addition, participants were contacted annually for a telephone follow-up interview to identify any clinical events or mortality. The HCHS/SOL study design, baseline examination, and procedures have been published previously (5,6).

Diabetes Assessment

Study procedures regarding diabetes ascertainment have previously been described in detail (7). Diabetes was defined based on self-report at annual follow-up call or at the visit 2 examination, which additionally included use of antihyperglycemic medication or American Diabetes Association laboratory criteria (8). Glycemic control was defined as an A1C level <7.0% (53 mmol/mol) (9).

Statistical Analyses

Statistical analyses were conducted on all HCHS/SOL participants with diabetes data who completed both the baseline and visit 2 examinations. All reported prevalence and incidence rate (IR) values and corresponding 95% CIs were weighted to adjust for sampling probability and nonresponse at baseline and visit 2, trimmed to handle extreme values of the weights, and calibrated to the age, sex, and Hispanic/Latino background distributions from the 2010 U.S. Census for the four study field centers (6). By using the sampling weights that adjusted for the nonresponse for visit 2, the inference of the IR estimates based on only participants who returned to visit 2 applies to the HCHS/SOL study population without diabetes at baseline. Sample sizes (*N*) reported are unweighted. Age-adjusted IR and 95% CIs were calculated for new cases of diabetes that occurred after the baseline examination and up until the visit 2 examination and are presented per 1,000 person-years (PY) of follow-up. In order to account for interval-censored data from annual follow-ups for diabetes incidence, a Poisson regression model was used with an offset for the time between annual follow-ups. Among people with diabetes, percentages were obtained for diabetes awareness, health insurance coverage, antihyperglycemic medication use, and glycemic control. Participant characteristics include sex, age at visit 2, Hispanic/Latino background (determined by self-report), and BMI (calculated as kilograms per meter squared from measures at the clinic examination). All analyses were performed using SAS version 9.4 (SAS Institute) and SUDAAN release 10.0.0 (RTI International).

RESULTS

For the target population of the HCHS/SOL, the overall age-adjusted diabetes IR was 22.1 cases/1,000 PY (95% CI 20.6, 23.8) and was similar among men and women (Table 1). Diabetes prevalence at visit 2 was 24.5% (95% CI 23.5, 25.6). At visit 2, differences were observed by Hispanic/Latino background, with individuals with Puerto Rican and South American backgrounds having the highest and lowest IR and prevalence, respectively. As expected, higher prevalence rates were observed among older age groups. However, the IRs for the 45–64 and ≥65-year-old age groups were not substantially different. Generally, diabetes IR and prevalence increased with increasing BMI category, with the obese category having the highest IR and prevalence. In the underweight category, small sample sizes and wide CIs limit accurate interpretation of these results.

Among individuals with diabetes, differences in diabetes awareness, access to health care, and treatment were observed by age, BMI, and Hispanic/Latino background. No significant differences in glycemic control were observed for these factors. Women (compared with men) had slightly greater diabetes awareness, treatment for diabetes, and glycemic control, despite having similar health insurance coverage. Among background groups, those with Puerto Rican and Central American backgrounds had the highest and lowest proportion of diabetes awareness, respectively, and those with a Dominican background had the highest proportion receiving treatment, yet lowest A1C control. Among age groups, the ≥65-year-old age category had the highest proportion of diabetes awareness, diabetes treatment, and health insurance coverage.

CONCLUSIONS

In the target population of the HCHS/SOL, the incidence of diabetes was 22.1 cases/1,000 PY, and the prevalence of diabetes increased from 16.9% at baseline (7) to 24.5% over a median follow-up of ~6 years. Diabetes incidence in Hispanic/Latinos was higher in our study compared with a previous national study reporting an overall incidence of 8.8/1,000 people in 2008, which was higher among Hispanic/Latinos at ~14.0/1,000 people (2). This higher incidence in the HCHS/SOL was expected, as this is a longitudinal observation of an older cohort that continues to be screened for diabetes, which has its strengths and limitations.

Across background groups, people with a South American background had the lowest incidence and prevalence of diabetes, while those with Puerto Rican and Mexican backgrounds had the highest incidence and prevalence. These results are consistent with findings from the Hispanic Health and Nutrition Examination Survey reporting a higher prevalence of diabetes among people with a Puerto Rican background (10). The incidence of diabetes was high among people with a BMI ≥30 kg/m^2, and findings from the HCHS/SOL also show that the prevalence of obesity at baseline is higher in those with Puerto Rican and Mexican backgrounds (11).

Health insurance coverage and diabetes awareness were high at visit 2. It is likely that health insurance coverage increased due to the implementation of the Affordable Care Act, and diabetes awareness increased due to health insurance coverage and the study results being returned to participants at baseline. Compared with other background groups, those with a Cuban background had the highest proportion with glycemic control despite having the lowest proportion insured, and those with a Dominican background had the lowest glycemic control despite having the highest treatment. In addition, changes in diabetes treatment and glycemic control were not significant and varied in direction by Hispanic/Latino background group, indicating that barriers to health persist in this population.

To our knowledge, this is the first study to examine diabetes incidence across a longitudinal cohort of diverse Hispanic/Latino background groups. Limitations include participants not returning for a clinic examination and not distinguishing between type 1 and type 2 diabetes. However, prevalence of diabetes was low

Table 1—IR and prevalence of diabetes and related characteristics by sex, Hispanic/Latino background, age, and BMI among Hispanic/Latino adults returning for HCHS/SOL visit 2 (2014–2017) examination

	Sample size (N)	IR[a] (95% CI)	Prevalence[b] at visit 2	Among adults with diabetes[b]			
				Awareness	Health insurance	Treatment	A1C control (<7%)
Overall	11,619	22.1 (20.6, 23.8)	24.5 (23.5, 25.6)	78.9 (75.2, 82.2)	77.2 (73.7, 80.3)	46.7 (42.9, 50.5)	57.6 (53.7, 61.5)
Men	4,280	22.1 (19.8, 24.7)	24.2 (22.7, 25.7)	77.2 (71.6, 81.9)	77.6 (72.3, 82.2)	44.9 (39.9, 50.1)	54.5 (48.6, 60.3)
Women	7,339	22.2 (20.2, 24.4)	24.8 (23.5, 26.2)	80.4 (75.2, 84.6)	76.8 (72.4, 80.7)	48.4 (43.1, 53.9)	60.2 (54.7, 65.4)
Hispanic/Latino background							
Dominican	1,020	18.6 (14.6, 23.8)	24.2 (21.3, 27.3)	74.9 (66.5, 81.8)	91.4 (79.2, 96.8)	56.7 (45.6, 67.2)	53.1 (39.4, 66.4)
Central American	1,207	13.3 (10.6, 16.6)	20.1 (17.9, 22.5)	60.6 (53.5, 67.4)	73.5 (64.7, 80.8)	44.2 (36.3, 52.4)	55.9 (48.5, 63.2)
Cuban	1,644	17.5 (15.1, 20.3)	17.6 (15.9, 19.6)	82.6 (78.6, 86.0)	71.4 (49.4, 86.5)	42.3 (27.9, 58.1)	64.9 (48.6, 78.4)
Mexican	4,804	26.5 (23.9, 29.4)	27.8 (26.1, 29.5)	82.4 (78.0, 86.0)	67.5 (62.3, 72.4)	44.5 (39.5, 49.6)	59.1 (54.2, 63.9)
Puerto Rican	1,801	27.1 (22.6, 32.5)	29.1 (26.3, 32.0)	86.9 (80.9, 91.2)	92.8 (87.3, 96.0)	52.1 (42.9, 61.2)	55.4 (45.3, 65.1)
South American	795	12.3 (8.9, 17.0)	14.2 (11.5, 17.4)	69.5 (65.1, 73.6)	80.9 (64.0, 91.0)	28.6 (21.6, 36.9)	59.1 (52.3, 65.7)
Mixed/other	313	29.7 (20.4, 43.2)	25.8 (20.7, 31.6)	72.7 (65.8, 78.6)	82.9 (61.2, 93.7)	30.8 (22.6, 40.5)	71.7 (59.3, 81.5)
Age-group (years)							
18–44	2,757	12.1 (10.0, 14.6)	12.0 (10.5, 13.7)	76.2 (69.3, 81.9)	71.7 (65.0, 77.5)	36.8 (30.3, 43.9)	57.4 (50.4 64.0)
45–64	6,487	31.0 (28.6, 33.6)	31.8 (30.1, 33.5)	79.7 (76.6, 82.5)	75.2 (71.7, 78.5)	52.0 (48.4, 55.7)	56.4 (52.8, 59.9)
≥65	2,350	37.6 (32.2, 43.9)	49.4 (46.4, 52.4)	87.2 (84.5, 89.5)	96.9 (95.6, 97.9)	71.4 (67.4, 75.1)	60.4 (56.2, 64.5)
BMI (kg/m^2)							
Underweight (<18.5)	69	17.5 (4.2, 72.0)	15.1 (7.2, 29.1)	88.5 (74.4, 95.3)	58.8 (45.5, 71.0)	52.7 (39.8, 65.2)	96.9 (81.6, 99.5)
Normal (18.5 to <25)	1,911	9.0 (6.9, 11.6)	15.1 (13.2, 17.1)	91.2 (86.6, 94.3)	70.2 (57.6, 80.3)	47.8 (36.6, 59.3)	57.7 (45.7, 68.9)
Overweight (25 to <30)	4,341	18.4 (16.0, 21.1)	21.1 (19.6, 22.7)	83.8 (79.2, 87.6)	70.8 (63.6, 77.0)	41.6 (35.5, 48.0)	60.6 (52.8, 67.8)
Obese (≥30)	4,923	32.5 (29.4, 36.0)	31.4 (29.7, 33.2)	73.5 (67.7, 78.6)	82.3 (78.8, 85.4)	49.1 (43.8, 54.5)	56.0 (50.5, 61.4)

Data are percent (95% CI) unless otherwise indicated. [a]Per 1,000 PY follow-up, age-adjusted among individuals who completed visit 2 examination. [b]Prevalence results are weighted and standardized to the U.S. 2010 standard population.

in individuals aged <30 years, suggesting a large majority of people with diabetes in our study have type 2 diabetes (7). Future studies in HCHS/SOL should be proposed to evaluate potential mechanisms of disease not included in our analysis, such as other coexisting chronic conditions, the early onset and chronicity of obesity, systemic inflammation, early life exposures or events, nutritional factors, chronic conditions, environmental exposures, genetics/genomics, and others. Further interventions should be considered to address health disparities by Hispanic/Latino background groups.

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