Effects of Nativity Status on Rates of Diabetes Screening and Diagnosis in NYC

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Abstract

Objective: In this study, our goal was to examine the association between place of birth and rates of diabetes screening and diagnosis in New York City.

Research Design/Methods: Data for the study were obtained from the NYC Hanes Dataset of 2013-2014. Given our primary and secondary aims, we relied on data for participants who provided responses to the Computer-Assisted Personal Interview (n=1527). After accounting for potential confounders, we used logistic regression to obtain odds ratios, then we applied Cox proportional hazards regression to correct the odds ratio bias given that the outcomes are not rare in our sampled population. SAS University software was used to compute measures of association and 95% confidence intervals.

Results: After accounting for age, race and insurance coverage, the association between place of birth and diabetes screening is statistically significant (OR=1.352, C=1.008-1.814). The adjusted hazard ratio, HR=1.123, CI=0.968-1.303, was smaller and not significant. In terms of diabetes diagnosis, the crude odds ratio (OR=2.108, CI=1.45-3.06) was not significant after adjusting for age, race, education and income (OR=1.101, CI=0.676-1.794). Similarly, the crude hazard ratio was significant but not the adjusted hazard ratio (HR=2.208, CI=1.583-3.078; HR=1.141, CI=0.742-1.757).

Conclusion: Our study shows that the association between place of birth and diabetes screening is significant based on the odds ratio estimate but not the hazard ratio, accounting for age, race and insurance coverage. We also noted that place of birth is not associated with diabetes diagnosis after adjusting for age, race, education and income.

Background significance/ Introduction

Type 2 diabetes is the most common type of diabetes and accounts for 90-95% of all diabetes cases.[1] More than 34 million US adults have diabetes, and the condition is the leading cause of kidney failure, lower limb amputations and adult blindness.[1,2] Risk factors for diabetes include high cholesterol, hypertension, BMI, age, family history, and physical inactivity.[1,2] To allow for early diagnosis and reduce morbidity it is recommended that patients with certain risk factors get tested for blood glucose level.

Methods

Study population and data source

Participants were recruited using a 3-stage cluster sampling method to yield a sample that is representative of the NYC adult population.[10] Selection criteria were consistent with that of the NYC HANES 2004, so that the sample consisted of non-institutionalized adults age 20 years or older from the five boroughs of NYC, non-English speakers, illiterate individuals, pregnant women, and mentally or developmentally disabled individuals.[10] Participants not selected for the study included all adults living in group quarters, such as college dormitories and military or other non-institutional group quarters, an estimated 3.1% of the total population of NYC.[10]

Exposure

Participants were categorized as either US-born (States and DC (n=787)) or other (n=732). A total of 8 participants for whom information on place of birth is not available were not included in this study.

Outcome

Primary outcome: The first outcome studied is blood glucose testing among US-born and foreign-born participants.
Secondary outcome: Additionally, we looked at the variable DIQ_1, to compare self-reported diabetes diagnosis rates for our exposure groups.

Demographic variables and confounders

Based on our literature review, we found demographic and socioeconomic variables, such as age, gender, race, education, income and insurance coverage should be accounted for. Lifestyle risk factors also discussed in the study include BMI, physical activity and diet quality. Information on comorbidities (hypertension and hypercholesteremia) that could confound the association between our exposure and outcome were also obtained from the dataset.

Statistical Analysis

To provide information on the distribution of characteristics between US - born and foreign-born participants, we carried out multiple chi-square tests and denoted any difference by reporting p-values. We then applied logistic regression analyses to find the crude odds of receiving blood glucose test and having a diabetes diagnosis for foreign- born participants compared to those who are US-born. To identify confounders that should be included in our adjusted regression models, we applied the 10% rule of thumb and retained all variables that made the cut.
Considering the high prevalence of our outcomes in the study population, we also applied Cox proportional hazard regression analyses to correct the bias associated with the odds ratio estimates. Given the cross-sectional nature of the study, we estimated time-to-event by creating a new variable with a value of '1' for subjects with an event and '2' for subjects without an event (censored). For both of our outcomes, we ensured our regression models provided the best fit line estimates according to the A1C value. All analyses for the study were performed using the SAS statistical software and significant results were obtained at alpha=0.05.

Characteristics of study population based on place of birth

Total	**787 (51.8)**	**732 (48.2)**	
Age			
20-39	282 (35.4)	413 (48.7)	<0.0001
40-59	279 (39.8)	233 (30)	
60+	171 (24.9)	141 (21.3)	
Gender			
Male	290 (44.4)	347 (48.7)	0.1
Female	442 (55.6)	440 (51.3)	
Race			
Non-Hispanic White	147 (21.8)	365 (50.8)	<0.0001
Non-Hispanic Black	130 (17.3)	208 (26.5)	
Hispanic	262 (36.9)	125 (18.3)	
Asian	166 (24)	36 (4.5)	
Education			
High school or less	337 (52.2)	219 (32.5)	<0.0001
Some college	148 (20.4)	187 (24.8)	
College graduate	245 (27.4)	381 (42.6)	
Income			
<25,000	257 (42.7)	200 (23.3)	<0.0001
25,000-49,999	137 (23.7)	152 (20.6)	
50,000-74,999	70 (11.7)	98 (13.4)	
75,000-100,000	66 (10.5)	76 (10.4)	
>100,000	74 (11.4)	178 (27.2)	

Table 2 Crude and Adjusted estimates (Odds Ratios and Hazard ratios) of the Relationship Between Place of Birth and Diabetes Screening

	OR (95% CI)	HR (95% CI)
Foreign born (Crude)	1.184 (0.933-1.504)	1.090 (0.950-1.241)
Foreign born (Adjusted for age, race and insurance coverage)	1.352 (1.008-1.814)	1.123 (0.968-1.303)

Table 3 Crude and Adjusted estimates (Odds Ratios and Hazard Ratios) of the Relationship Between Place of Birth and Diabetes Diagnosis

	OR (95% CI)	HR (95% CI)
Foreign born (Crude)	2.108 (1.451-3.062)	2.208 (1.583-3.078)
Foreign born (Adjusted for age, race, education and income)	1.101 (0.676-1.794)	1.141 (0.742-1.757)

Discussion

Since both outcomes are common in the sampled population (921/1527=60.8% for diabetes screening and 158/1527=10.3% for diabetes diagnosis), odds ratios estimates may have been misleading. The methodological approach taken in this study allowed us to correct the bias induced through odds ratios calculations. Through the application of the Cox proportional hazard regression analysis, we noticed an overestimation of screening rates and an underestimation of diabetes diagnosis. As shown in table 2&3, crude and adjusted odds ratios were higher than hazard ratios for diabetes screening, whereas in the case of diabetes diagnosis, odds ratios estimates were lower than hazard ratios.