Impact of Limited English Proficiency on the Diagnosis and Awareness of Diabetes: The National Health and Nutrition Examination Survey, 2003–2018

Harland Holman,[1,2] Frank Müller,[1,2,3] Nikita Bhangu,[1] Jepkoech Kottutt,[1] and Omayma Alshaarawy[4]

Approximately 20% of the U.S. resident population speaks a non-English language at home (1). A growing body of evidence indicates that the presence of limited English proficiency (LEP) can negatively influence physical health status, outside of known racial and ethnic disparities. Numerous studies have shown that individuals with LEP experience barriers in accessing health care and have lower rates of receiving and continuing necessary care (2). These studies also revealed that individuals with LEP are less likely to obtain satisfactory care, be provided with pertinent information, understand disease processes, and trust their physicians (2).

These barriers can greatly impact diabetes care. Regular medical checkups are needed for early diagnosis of diabetes to prevent costly complications. However, individuals with LEP receive preventative screenings, including those for diabetes, at a lower rate (3). Prior inquiries into LEP and diabetes have focused on the management of established diabetes (4). The impact of LEP on the rate of undiagnosed diabetes is still unknown. Here, we use data from the National Health and Nutrition Examination Survey (NHANES) to estimate the association between LEP and diabetes diagnosis and awareness among U.S. adults.

Each year, NHANES staff recruit and assess a representative sample of the U.S. civilian population, selected via a multistage area–probability sampling approach (5). Analysis of the publicly available NHANES data (2003–2018) was approved by the Michigan State University Institutional Review Board as non–human subject research.

The NHANES household interview was conducted in person with a trained interviewer using a computer-assisted personal interviewing system. Participants selected the language of interview (English or Spanish) or requested an interpreter. Here, LEP was categorized into the following: 1) interview completed in English, an interpreter was not needed (coded 0); 2) interview completed in Spanish, an interpreter was not needed (coded 1); and 3) an interpreter was needed (coded 2).

This study sample included nonpregnant fasting participants (aged ≥18 years) who were examined in NHANES morning sessions and answered "No" to the question "Other than during pregnancy, have you ever been told by a doctor or health professional that you have diabetes or sugar diabetes?" ($n = 15,983$). Undiagnosed diabetes was defined as having fasting blood glucose level ≥7.0 mmol/L (≥126 mg/dL) and/or glycated hemoglobin (HbA_{1c}) level ≥48 mmol/mol (≥6.5%).

Descriptive analyses were conducted to assess the characteristics of the study sample by LEP. Logistic regression was used to estimate the association between LEP (exposure) and undiagnosed diabetes (outcome). Odds ratios (OR) were generated, with adjustments for NHANES sample design, using SAS (V.9.4, SAS Institute, NC).

Compared with participants who completed their interview in English, participants who needed an interpreter were older (+3 years) and were more likely to have high school education or less (73.2% vs. 37.1%), lack health insurance (57.6% vs. 84.2%), and have lower BMI (−2.4 kg/m^2). Participants who completed the interview in Spanish were younger (−4 years) and more often male (54.8% vs. 48.4%), and they were more likely to have a high school education or less (82.7%) and lack health insurance (38.1%) than English-speaking participants.

The prevalence of undiagnosed diabetes was nearly doubled among participants who completed the interview in Spanish (6.5%) and participants who needed an interpreter (6.7%) compared with participants who completed their interview in English (3.4%). Controlling for potential confounders did not change the conclusion (Table 1). Compared with participants who completed their interview in Spanish (OR 1.8; 95% CI

[1]Department of Family Medicine, College of Human Medicine, Michigan State University, Grand Rapids, MI
[2]Spectrum Health Family Medicine Clinic, Grand Rapids, MI
[3]Department of General Practice, University Medical Center Göttingen, Göttingen, Germany
[4]Department of Family Medicine, College of Human Medicine, Michigan State University, East Lansing, MI

Corresponding author: Omayma Alshaarawy, alshaara@msu.edu

Table 1—Results from multiple logistic regression models estimating the association between English proficiency and undiagnosed diabetes

	Crude adjusted OR* (95% CI)	Age- and sex-adjusted OR† (95% CI)	Multivariable-adjusted OR‡ (95% CI)
Interview completed in English; interpreter not needed	1 (reference)	1 (reference)	1 (reference)
Interview completed in Spanish; interpreter not needed	2.0 (1.6, 2.5)	2.5 (2.0, 3.1)	1.8 (1.3, 2.4)
Interpreter needed	2.0 (1.3, 3.3)	1.9 (1.1, 3.0)	2.2 (1.3, 3.7)

Data are from NHANES 2003–2018 (n = 15,983). *Estimates are adjusted for NHANES survey design. NHANES fasting weights are applied in all analyses. Total length of fasting ranged from 8 to 23 h (mean 11.6 h for participants who completed their interview in English, 12.0 h for participants who completed their interview in Spanish, and 12.0 h for participants who needed an interpreter). †Estimates are additionally adjusted for age (years) and sex (male/female). ‡Estimates are additionally adjusted for ethnicity (Hispanic/non-Hispanic), education (less than high school degree/high school degree/more than high school), health insurance (yes/no), BMI (kg/m^2), total length of fasting (hours), and NHANES survey cycle indicator.

1.3, 2.4) or needed an interpreter (OR 2.2; 95% CI 1.3, 3.7) had higher odds of undiagnosed diabetes. There were no differences in the odds of undiagnosed diabetes between participants who completed their interview in Spanish and those who needed an interpreter ($P > 0.05$).

Early stages of diabetes are often associated with no or low symptom burden. Affected individuals might not seek medical attention on their own. This makes it crucial to create awareness of diabetes and its predisposing factors. Our study showed that ∼6.5–6.7% of individuals with LEP either have undiagnosed and untreated diabetes or have been diagnosed but do not know about it when asked. This finding is concerning and should draw health care providers' attention to the need for specifically screening patients with LEP at risk for diabetes. These patients can face severe long-term health problems and increase the burden on the health care system.

Study limitations include the reliance on the language of the NHANES interview to define LEP and the lack of comprehensive language assessments. Additionally, NHANES does not provide information on diabetes type. However, the representativeness of the study highlights the considerable inequity in diabetes care and reveals the need for action.

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