Undiagnosed diabetes in Brazilian adults: estimates from the PNS 2013

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Undiagnosed diabetes represented about *one-third of total cases in Brazil* in 2013. The inequities observed highlight *the need to prioritize targeting high-risk groups*.

BACKGROUND

Undiagnosed diabetes is a recognized public health problem. Brazil, ranked sixth globally in total number of adults living with diabetes, lacks population estimates of undiagnosed diabetes. **We aimed to describe the prevalence of undiagnosed diabetes in Brazil.**

METHODS

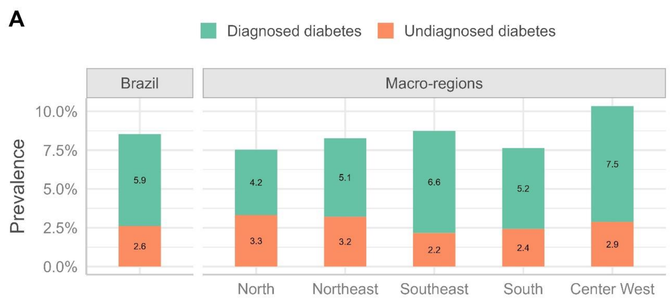
A sub-sample of adults (≥ 18 years) was randomly selected (*n* = 8952) for collection of biological material from the **Brazilian National Health Survey (*Pesquisa Nacional de Saúde*, PNS) 2013**, a representative household survey. Levels of glycated hemoglobin A1c (HbA1c) were determined in a NDPG-certified laboratory. After exclusions (participants without a valid HbA1c measure and/or pregnant women), our analytic sample had 8459 individuals. **Those not reporting a previous diagnosis and having an HbA1c ≥ 6.5% were classified as having undiagnosed diabetes.** Post-stratification weights were used to obtain representative estimates.

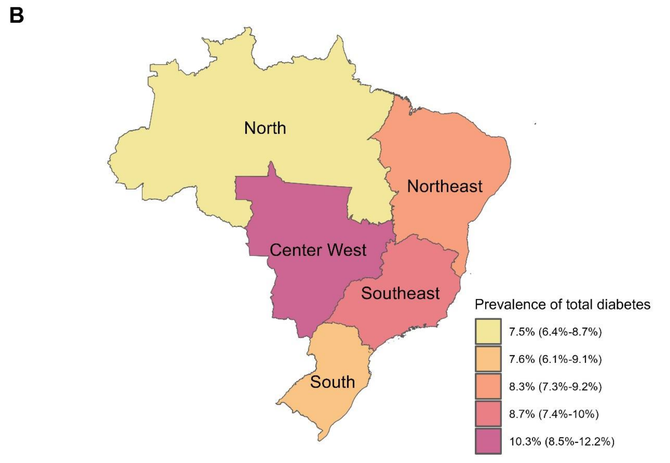
RESULTS

In Brazil, in 2013, the age-standardized prevalence of undiagnosed diabetes cases was 2.6% (95% CI 2.2%-3.0%) **(Figure 1A)**. For the five Brazilian macro-regions, estimates ranged from 2.2% (in Southeast, 95% CI 1.5%-2.9%) to 3.3% (in North, 95% CI 2.5%-4.1%) for the prevalence of undiagnosed diabetes cases. Considering diagnosed and undiagnosed cases, the prevalence of total diabetes varied from 7.5% (in North, 95% CI 6.4%-8.7%) to 10.3% (in Center West, 95% CI 8.5%-12.2%) **(Figure 1B)**. Brazil overall showed a prevalence of total diabetes of 8.5% (95% CI 7.8%-9.2%), which corresponds to a proportion of undetected diabetes cases of 30.7% (95% CI 26.7%-34.6%) **(Figure 1C)**. Additionally, it was observed a significant difference in the proportion of undiagnosed diabetes for the five Brazilian macro-regions (p = 0.0053). The North presented the highest estimate 44.2% (95% CI 36.2%-52.1%), i.e., the ratio between diagnosed and undiagnosed cases was ~1:1.

When crude estimates of the prevalence of undiagnosed diabetes were examined **(Table 1)**, a significant gradient was found with age group, ranging from 0.9% (18-29 years, 95% CI 0.4%-1.3%) to 5.2% (60 years or older, 95% CI 4.0%-6.5%). The age-standardized prevalence of undiagnosed diabetes was higher among those who declared to be black (3.9%; 95% CI 2.1%-5.7%) than among those who declared to be white (2.1%; 95% CI 1.6%-2.7%); higher among those with less than a high school education (3.0%; 95% CI 2.4%-3.6%) than those with greater than a high school education (1.4%; 95% CI 0.7%-2.1%); higher among those individuals who were receiving cash transfer (5.1%; 95% CI 2.0%-8.1%) than those who were not receiving cash transfer (2.4%; 95% CI 2.0%-2.8%); and higher among adults in overweight (2.7%; 95% CI 2.0%-3.3%) and obesity (5.0%; 95% CI 3.7%-6.3%) than those in low/normal weight (1.2%; 95% CI 0.8%-1.6%).

RESULTS (CONTINUED)





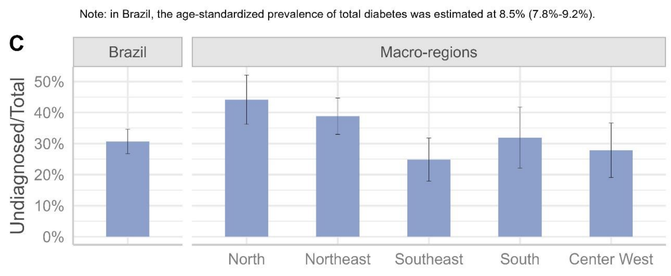


Figure 1. Age-standardized estimates: (A) Prevalence of total diabetes; (B) Prevalence of diagnosed and undiagnosed diabetes; (C) Proportion of undiagnosed diabetes. The Brazilian National Health Survey, 2013.

Table 1. Prevalence of undiagnosed diabetes (HbA1c > 6.5%), total diabetes (diagnosed and undiagnosed combined), total diabetes that is undiagnosed, the Brazilian National Health Survey, 2013.

	Undiagnosed diabetes	Total diabetes	Proportion of undiagnosed diabetes
Crude estimates			
Total	2.8% (2.4%-3.3%)	9.5% (8.7%-10.3%)	29.8% (26.0%-33.6%)
Age group (years)			
18-29	0.9% (0.4%-1.3%)	2.0% (1.1%-2.9%)	43.2% (21.9%-64.5%)
30-44	1.9% (1.2%-2.6%)	3.9% (2.9%-5.0%)	48.6% (35.6%-61.7%)
45-59	4.2% (3.2%-5.1%)	14.1% (12.3%-15.9%)	29.7% (23.8%-35.6%)
≥ 60	5.2% (4.0%-6.5%)	22.8% (20.4%-25.3%)	22.9% (17.8%-28.0%)
Age-standardized estimates			
Sex			
Men	2.3% (1.8%-2.8%)	7.3% (6.3%-8.3%)	31.4% (25.1%-37.7%)
Women	2.9% (2.3%-3.5%)	9.5% (8.6%-10.5%)	30.4% (25.3%-35.4%)
Race/Color			
White	2.1% (1.6%-2.7%)	7.6% (6.6%-8.6%)	27.8% (21.6%-33.9%)
Black	3.9% (2.1%-5.7%)	10.8% (8.2%-13.4%)	36.2% (23.1%-49.3%)
Brown	2.9% (2.3%-3.5%)	9.1% (8.0%-10.1%)	32.0% (26.5%-37.4%)
Other	4.3% (1.0%-7.6%)	10.1% (3.6%-16.5%)	43.0% (12.5%-73.5%)
Education			
Less than high school	3.0% (2.4%-3.6%)	9.1% (8.2%-10.0%)	33.0% (27.9%-38.1%)
Completed high school	2.2% (1.4%-3.0%)	8.4% (6.7%-10.1%)	26.4% (17.7%-35.1%)
Greater than high school	1.4% (0.7%-2.1%)	6.0% (4.5%-7.6%)	22.7% (12.2%-33.1%)
Private health insurance			
Yes	2.0% (1.3%-2.7%)	7.9% (6.6%-9.2%)	25.2% (17.7%-32.7%)
No	2.9% (2.4%-3.4%)	8.8% (8.0%-9.6%)	32.9% (28.2%-37.5%)
Receiving cash transfer			
Yes	5.1% (2.0%-8.1%)	9.6% (6.0%-13.2%)	52.6% (31.2%-74.0%)
No	2.4% (2.0%-2.8%)	8.3% (7.6%-9.0%)	29.2% (25.1%-33.2%)
Body mass index (kg/m²)			
Low/Normal (< 25)	1.2% (0.8%-1.6%)	4.8% (4.0%-5.6%)	25.0% (17.6%-32.5%)
Overweight (25-29.9)	2.7% (2.0%-3.3%)	8.5% (7.2%-9.7%)	31.5% (24.7%-38.2%)
Obesity (≥ 30)	5.0% (3.7%-6.3%)	14.7% (12.9%-16.6%)	33.9% (27.0%-40.9%)
Hypertension			
Yes	5.0% (1.8%-8.1%)	15.9% (12.4%-19.4%)	31.1% (17.0%-45.1%)
No	2.6% (2.1%-3.1%)	5.5% (4.8%-6.2%)	47.4% (40.7%-54.0%)

CONCLUSIONS

Based on these estimates, undiagnosed diabetes represented about one-third of total cases in Brazil in 2013. The inequities observed highlight the need to prioritize targeting high-risk groups. Of note, given the large variability in glucose measurement, these widely used metrics in epidemiology overestimate case detection, deserving further improvement.

CONTACT INFORMATION

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