Comparison of Prevalence of Diabetes Complications in Brazilian and Mexican Adults

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Abstract

[EXSCINDED] Abstract Abstract Abstract Abstract Abstract Abstract Background Brazil and Mexico are the most populous countries in Latin America. Diabetes is a global growing problem. Although there are laws in the constitutions of both countries, Mexico and Brazil, regarding ensuring access to health, emphasizing the issue of diabetes, both populations are affected for this disease from different perspectives. The objective of this study was comparing the results of the National Health Survey “PNS” in Brazil and the National Survey Health and Nutrition “ENSANUT” in Mexico regarding prevalence, complications and healthcare issues of diabetes in both countries. Methods A cross-sectional study was conducted with data from the National Health Survey (PNS) in Brazil, and the National Survey of Health and Nutrition (ENSANUT) in Mexico. The variables used in the PNS were taken from module P - Lifestyles and the Q module - Chronic Diseases The corresponding variables were searched in ENSANUT, module III - Diabetes Mellitus and module XIII - Risk Factors. The odds ratio for having any diabetes complication was calculated for all variables which were significant ($p < 0.05$) in the descriptive analyses in two logistic regression models: simple models, with a regression performed with each variable separated and an adjusted model with all variables included. Results The prevalence of diabetic was 6.8% in Brazil and 9.4% in Mexico. There were significant differences between age and time with diabetes between both countries. The odds of a Mexican comparing to a Brazilian diabetic patient of having a complication was 2.01 in the simple logistic regression model and 3.04 in the adjusted model ($p < 0.0001$). Loss vision was the most frequent complication. Protector factors were physical exercise and drinking alcohol less than monthly. Conclusions Diabetes complications are important health problems in Brazil and Mexico. National health surveys add significant information about the impact of diabetes in these Latin American populations. This comparison of data could provide available information to guide national policies and program decisions in both countries.

Background

Diabetes is a global growing problem. The last report of the International Diabetes Federation (IDF) in 2017 estimated global prevalence of diabetes in 424.9 million (8.8%), indicating that 1 of 11 people had diabetes.¹ Type 2 diabetes is more frequent in Latin American people than non-Hispanics whites² due to a combination of genetic and lifestyles risk factors.³ Brazil and Mexico are the most populous countries in Latin America.⁴ The age-adjusted prevalence of diabetes in Brazil is 8.7% compared to 14.7% in Mexico. The estimation classifies Brazil as the 3rd country with the highest number of undiagnosed diabetes, the 5th country with more diabetic older-adults, accounting for 4.9 million. This number is prospected to increase to 11.9 million in 2045. The same report ranks Mexico in the 8th country of undiagnosed diabetics, and 9th in the ranking of countries with more diabetic older-adults representing 4.5 million with an increment estimated of 7.6 million people to 2045.¹

The diabetic complications as a consequence of a poor glucose control generate a negative impact on the economy of the countries. The cost generated by diabetes in Mexico is near to \$19 USD billions and

in Brazil reach to \$ 24 USD billions. Those costs correspond to a per-patient expense of \$1,583 and \$ 1,920 USD in Mexico and Brazil, respectively.^{1,5} Although there are laws in the constitutions of both countries, Mexico and Brazil, regarding ensuring access to health, emphasizing the issue of diabetes, both populations are affected for this disease from different perspectives.⁶⁻⁸ In response to the different health issues they face, both countries performed national surveys of health. The objective of these surveys was to have a situational diagnostic of the population regarding their health problem including Non-communicable Diseases (NCDs) like diabetes, hypertension, dyslipidemia, obesity, among others.^{9,10} Although both national surveys were developed independently by both countries, many approaches are similar allowing to compare different aspects of the prevalence and healthcare for the diseases, in this case, diabetes.

The objective of this study was comparing the results of the National Health Survey “PNS” in Brazil and the National Survey Health and Nutrition “ENSANUT” in Mexico regarding prevalence, complications and healthcare issues of diabetes in both countries.

Methods

A cross-sectional study was conducted with data from the National Health Survey (PNS) of 2013 in Brazil, and the National Survey of Health and Nutrition (ENSANUT) of 2012 in Mexico. These are national surveys based on household sampling and both questionnaires used have been published previously. Both surveys are public and were conducted by the Brazilian Institute of Geography and Statistics with the Ministry of Health/Brazil (<https://biblioteca.ibge.gov.br/visualizacao/livros/liv91110.pdf>.) and the National Institute of Public Health/Mexico (https://ensanut.insp.mx/ensanut2016/descarga_bases.php), respectively. The study protocol was approved by the research and ethical committee of the University Center of Tonalá of University of Guadalajara in Mexico. Due to is an observational study and the data are public consent was not required.

We included all adults (18 years and older) participants from both surveys who reported receiving the diagnostic of diabetes by a medical doctor. The present analysis excluded those participants reporting diabetes only during the pregnancy.

The variables used in the PNS (2013) were taken from module P - Lifestyles: P027 and P034; and the Q module - Chronic Diseases, questions: Q029, Q030, Q031, Q039, Q040, Q03401, Q4607, Q04704, Q04701, Q04702, Q04608, Q05506, Q05507, Q05501, Q12602, Q55b, Q05508. The corresponding variables were searched in ENSANUT (2012), module III - Diabetes Mellitus and module XIII - Risk Factors: a1311, a309b, a101d, a301, a302b, 0305, a306, a307, a310b, a310c, a310d, a310e, a312c, a313a, a313b, a313c, a313f, a313g, a313h, respectively.

For purposes of statistical analysis, some variables had their responses recategorized. The time of diabetes was categorized as < 5 years, 5 to <10 years, 10 to <15 years, and 15 years or more. Obesity was collected in different ways in both surveys: In Brazil, self-reported height and weight were recorded, and

Body Mass Index calculated in kg/m². Mexico used the Stunkard scale consisting of 9 silhouette figures that gradually increase in size from very thin (a value of 1) to very obese (a value of 9). Those results were classified into underweight (figures 1 and 2 and BMI, < 18.5 kg/m²), normal weight (figures 3 and 4 and BMI between 18.5 and 25 kg/m²), overweight (figures 5 through 7 and BMI between 25 and 30 kg/m²), and obese (figures 8 and 9 and BMI ≥ 30kg/m²) following the classification of Bhuiyan et al.¹¹ The frequency of alcohol consumption was reclassified as for both countries: never drinks, less than once a month, and once or more per month.

The frequency distribution of sociodemographic and healthcare characteristics of diabetes and the diabetes complication for each country was computed and its association tested by ², except for age where mean and standard deviation was calculated also for each country and the difference was tested by unpaired Student t-test. The odds ratio for having any diabetes complication was calculated for all variables which were significant (p<0.05) in the descriptive analyses in two logistic regression models: simple models, with a regression performed with each variable separated and an adjusted model with all variables included. All statistical analyses were conducted using SPSS software (IBM Corporation, Armonk NY) version 17.0.

Results

Diabetes was reported by 3,636 Brazilians (6.8% of all n = 60,203 participants) and 4,490 Mexicans (9.4% of n = 46,277). There were significant differences between age and time with diabetes. Furthermore, we observe differences between the region of precedence, health care system, treatment, access to laboratory tests and, prevention.

Table 1 shows the demographic characteristics of both populations. The largest population was women with 63% and the average of age was 58.5±13.55 years, being older the population from Brazil. Most of the population with diabetes lives in a metropolitan area in both countries. In Mexico, more people have diabetes in rural areas compared than Brazil. Obesity was more prevalent in Brazil.

Distribution of the characteristics of healthcare for diabetes in Brazil and Mexico were similar (Table 2). Diabetic patients in Mexico reported receiving medical care much often than in Brazil, were a quarter reported not receiving medical care in the last 12 months. This percentage is half of reported in Mexico. The treatment most reported was the use of only pills for controlling diabetes in both countries, besides it was more reported in Mexico. Comparing to Mexico, in Brazil more participants mentioned not using any medication or using both insulin and pills for controlling diabetes. In Brazil, most participants reported performing laboratory exams to monitor diabetes. In both countries, serum blood glucose was the exam most reported and the least reported was blood strips in Brazil and Hb_{A1C} in Mexico. The clinical exam of the feet was performed in almost half of the Brazilian participants and only 13% of those in Mexico. All healthcare characteristics were significantly associated with the country (p<0.0001).

The frequency of diabetes complications is shown in table 3. The complication most prevalent was visual impairment. Near to 50% of participants had developed one or have more than one.

Table 4 shows the predictions of a participant presenting any diabetic complication. In the simple logistic models, each variable with significant differences between countries was tested for their predictions to the complication. In these models, Mexico had twice the odds of having a complication ($p < 0.0001$). Comparing to those participants living in metropolitan areas those in interior and rural homes presented higher odds of complication, 11%, and 21%, respectively. Sex, Hb_{A1C} , were not significant in both simple and adjusted models. However, we observed a statistical trend ($p = 0.070$) in sex in the adjusted model, where women presented as having lower odds (10%) than men for having a diabetes complication. When adjusting for other variables, participants from Mexico had three times more odds of presenting complication from diabetes. In the adjusted model, age lost its significance. The time with diabetes was a significant predictor of complication. Participants with a history of diabetes between 5 and less than 10 years presented 39% more odds of having a complication than those with less than 5 years. The odds for those between 10 and 15 years were 94% and 15 years or more 147%.

Comparing with those who had private health care, participants with public had 31%, with other health care 237% more odds of presenting a complication. Participants on any type of medication, those who performed blood strips, urinalysis, serum blood glucose, and feet exam, were underweighted, with a history of cardiovascular and dyslipidemia had significantly more odds of having diabetes complication even in the adjusted model. Significant protector factors were physical exercise and drinking alcohol less than monthly (Table 4).

Discussion

This article aimed to compare the prevalence of diabetes complications in Brazil and Mexico using two official national based researches. The data collected in both National Health Survey (PNS) of Brazil and the National Survey of Health and Nutrition (ENSANUT) in Mexico have several similarities, besides their dissimilar sample designs and questions. Both are instruments of public health with the objective to collect information about the population in different regions.

In recent years have been identified some genetic variants which are associated with the risk to develop diabetes between Mexican and Brazilian people.^{12,13} However, some specific genotypes are more common in Mexican than other populations, this relation is according with the present results where being Mexican confers a higher risk to develop diabetes and its complications compared to being Brazilian.¹⁴ Moreover, the odds calculated in our study are in concordance with the evidence because of the longer time with diabetes the more probability of presenting a complication.¹⁵

Visual impairment was the most significant complication in both countries, being more prevalent in Mexico. Diabetic retinopathy is the most common complication in patients with long-term exposition to hyperglycemia leading to vision impairment.¹⁶ The odds of having diabetes complication were higher in

those participants living in rural areas, independently of country, age, physical activity, health access or medical treatment. Bos et al.¹⁷ observed worst health and socioeconomic conditions in Brazilian rural older-adults than those living in urban environment, supporting our findings. The differences in diabetes complications, observed in our results, point-out that they are not related to medical care or life-style differences. The frequency of diabetes complications was similar in both sexes. In a recent publication, observed no gender differences in microvascular complications of diabetes. However, they observed higher frequency of macrovascular complications of diabetes in men.¹⁸ Older age was associated to higher odds of complication in the simple model, but lost its significance when adjusting for length of diabetes. This finding may indicate that not age but the length of the disease process is a major risk factor for diabetes complication. In the study by Al-Saeed et al.¹⁹ Australian patients with earlier onset of diabetes had an increased risk of renal and peripheral nerve complications and higher standardized mortality compared to those whose onset were in the middle age and older-adult stage.

In this context, we can observe a relation with the metropolitan and not doing exercise. This is a known risk factor to develop diabetes and other NCDs. Lifestyle plays an important role in the control of diabetes. Physical activity can improve tissue function and prevent complications caused by diabetes, such as diabetic nephropathy, diabetic retinopathy, diabetic neuropathy, and cardiovascular disorders.²⁰ Among the physical activities, the aerobic exercise has been considered a major nonmedical strategy that can promote beneficial and protective effects to combat metabolic disorders, diabetes and the complications induced by hyperglycemia.²¹ This confirms the results of the present study that found the physical exercise as a protect factor for the complications of diabetes. In the present study, we observed that the participants with underweight presented a greater risk of diabetes complications. In the cohort study by Sairenchi et al.²² conducted in Japan, found, in older-adults 60 to 79 years-old, that lower BMI was associated with the risk of developing diabetes.

The consumption of alcohol, at least monthly, was protective for diabetic complication, in the present study. The scientific literature points-out that moderate alcohol consumption has been consistently associated with a decreased risk of type 2 diabetes compared to abstention or excessive consumption.²³ This finding could be explained by the improvement in insulin sensitivity, anti-inflammatory effects or effects of adiponectin due to moderate alcohol consumption.²⁴

Healthcare system plays an important role in the development of complications. Some authors had reported higher odds of having retinopathy and nephropathy in people that use public healthcare system. This relation is sustained in socioeconomic disparity, due to most people that use public services have low income and therefore less access to medicines and novel therapies. Moreover, other factors that contribute are a low education level, lack of information in health staff and limited access to diagnostic tools.²⁵ Furthermore, our findings show a significative increase in the risk of complications according to the treatment, however, the use of insulin or oral antidiabetic *per se* not have a direct relationship with the presence of complications. The pharmacological family is who has more efficacy to maintain or achieve the glycemic control over time.²⁶ In Mexico and Brazil, certain drugs are not available in public healthcare

system due to the high cost, despite of some medications are subsidized by government.^{27,28} In our study this is a limitation, because both national health surveys not distinguish between groups of medications. Other factor that could contribute to this relation is the adherence to the treatment. Only 37% of the patients that use insulin in combination with an oral antidiabetic agent had a high compliance.²⁹ However, there are several factors that affect the adherence to the treatment.³⁰

In both populations studied was found the presence of metabolic syndrome as a risk factor to develop diabetic complications. The risk for diabetes is up to fivefold higher in patients with the syndrome.³¹ Metabolic syndrome is a group of metabolic disorders centered around insulin resistance, with basic features including abnormal glucose metabolism, central obesity, lipid disorders and hypertension.³² Actually, most of the countries in Latin America exhibit a high prevalence of metabolic syndrome and consequently, an alarming increase in the prevalence of diabetes and cardiovascular diseases is expected in the region, the differences in the prevalence of metabolic syndrome between populations may result from environmental factors, such as differences in physical activity and dietary patterns, reflecting some differences in the development status between them. However, differences in their genetic backgrounds may also play a role. The link in this relation is the inflammatory response that metabolic alterations generated.³³

The design of both population surveys brings some limitations regarding to their interpretation. The authors faced difficulties during the discussion of the results, since most scientific papers are more concerned on the risk of having or not diabetes and not dealing on identify factors related to the development of the disease complication. Thus, the present work brings a novel approach with important information for the long-term care for the diabetic patients. Another limitation is not account for the possible ethnicity difference between both countries. This difference can be implied by the dissimilarities observed in the rural area in the models, since indigenous population tend to live in rural areas. Moreover, in a cross-sectional study is difficult to show a real relation and differences between both populations, however this first approach allows us see similarities and differences between countries with largest populations in Latin America.

Conclusion

Complications are important health problems in both countries, but higher in Mexico. Visual impairment was the most reported complication.

Diabetes complications are important health problems in Brazil and Mexico. National health surveys add significant information about the impact of diabetes in these Latin American populations. This comparison of data could provide available information to guide national policies and program decisions in both countries.

List Of Abbreviations

BMI: Body Mass Index; *ENSANUT*: National Survey of Health and Nutrition (Mexico); *IDF*: International Diabetes Federation. *NCDs*: Non-communicable Diseases; *OR*: odds ratio; *PNS*: National Health Survey (Brazil).

Declarations

Ethics approval and consent to participate

The study protocol was approved by the Research and Ethical Committee of the University Center of Tonalá of University of Guadalajara in Mexico.

Consent to participate

Not applicable

Consent for publication

Not applicable

Availability of data and materials

The data that support the findings of this study are available from at the Brazilian Institute of Geography and Statistics with the Ministry of Health/Brazil

(<https://biblioteca.ibge.gov.br/visualizacao/livros/liv91110.pdf>.) and the National Institute of Public Health/Mexico (https://ensanut.insp.mx/ensanut2016/descarga_bases.php) respectively.

All data generated or analyzed during this study are included in this published article.

Competing interests

The authors declare that they have no competing interests.

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Author contributions

RBM, AJGB and, ARMS participated in the design of the study. RBM, SAOB, SFH and, RCBR performed evaluation and data collection. RBM, SAOB, SFH and, RCBR participated in data interpretation. ARMS and

AJGB performed the statistical analysis of the data.

All authors helped to draft the manuscript and read and approved the final manuscript.

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Tables

Table 1. Demographic characteristics of diabetic participants in Brazil and Mexico

	Countries			
Characteristics	Brazil	Mexico	Total	<i>P</i>
	n (%)	n (%)	n (%)	
Sex				
Men	1281 (35.23)	1723 (38.37)	3004 (36.97)	0.0035
Woman	2355 (64.77)	2767 (61.63)	5122 (63.03)	
Age, years	59.6±13.85	57.6±13.24	58.5±13.55	<0.0001
Region				
Metropolitan	2246 (61.77)	2214 (49.31)	4460 (54.89)	<0.0001
Urban	847 (23.29)	1019 (22.69)	1866 (22.96)	
Rural	543 (14.93)	1257 (28.00)	1800 (22.15)	
Time with DM				
< 5 years	1490(40.98)	1762(39.24)	3252(40.02)	<0.0001
5 to < 10 years	665(18.29)	1014(22.58)	1679(20.66)	
10 to <15 years	548(15.07)	783(17.44)	1331(16.38)	
15 years or more	933(25.66)	931(20.73)	1864(22.94)	
Physical exercise				
No	2827 (77.75)	4047 (90.13)	6874 (84.59)	<0.0001
Yes	809 (22.25)	443 (9.87)	1252 (15.41)	
Alcohol				
No	2837 (78.03)	2898 (64.54)	5735 (70.58)	<0.0001
Less than monthly	324 (8.91)	1141 (25.41)	1465 (18.03)	
At least monthly	475 (13.06)	451 (10.04)	926 (11.40)	
Silhouette				
Underweight	26 (1.10)	705 (16.90)	731 (11.20)	<0.0001
Normal weight	576 (24.45)	1305 (31.29)	1881 (28.82)	
Overweight	929 (39.43)	1966 (47.13)	2895 (44.35)	
Obese	825 (35.02)	195 (4.68)	1020 (15.63)	
Cardiovascular				
No	1367 (37.81)	2398 (53.41)	3765 (46.45)	<0.0001
Yes	2248 (62.19)	2092 (46.59)	4340 (53.55)	
Dyslipidemia				
No	2249 (61.85)	1948 (43.39)	4197 (51.65)	<0.0001
Don't know	0 (0.00)	1122 (24.99)	1122 (13.81)	
Yes	1387 (38.15)	1420 (31.63)	2807 (34.54)	
Total	3636 (44.75)	4490 (55.25)	8126 (100.00)	

Table 2. Healthcare characteristics of Diabetes in Brazil and Mexico.

	Countries			
	Brazil	Mexico	Total	<i>P</i>
	n (%)	n (%)	n (%)	
Received medical care				
No	931 (25.61)	575 (12.81)	1506 (18.53)	<0.0001
Yes	2705 (74.39)	3915 (87.19)	6620 (81.47)	
Type of medical care				
Private	768 (21.12)	612 (13.63)	1380 (16.98)	<0.0001
Public	1915 (52.67)	3303 (73.56)	5218 (64.21)	
Do not receive care	931 (25.61)	575 (12.81)	1506 (18.53)	
Other	22(0.61)	0 (0.00)	22 (0.27)	
DM treatment				
None	742 (20.41)	564 (12.56)	1306 (16.07)	<0.0001
Only insulin	162 (4.46)	239 (5.32)	401 (4.93)	
Only pills	2253 (61.96)	3397 (75.66)	5650 (69.53)	
Both	479 (13.17)	290 (6.46)	769 (9.46)	
Blood glucose				
No	717 (19.72)	2245 (50.00)	2962 (36.45)	<0.0001
Yes	2919 (80.28)	2245 (50.00)	5164 (63.55)	
Blood strips				
No	1631 (44.86)	3217 (71.65)	4848 (59.66)	<0.0001
Yes	2005 (55.14)	1273 (28.35)	3278 (40.34)	
Hb_{A1C}				
No	1403 (38.59)	4099 (91.29)	5502 (67.71)	<0.0001
Yes	2233 (61.41)	391 (8.71)	2624 (32.29)	
Urinalysis				
No	1102 (30.31)	3005 (66.93)	4107 (50.54)	<0.0001
Yes	2534 (69.69)	1485 (33.07)	4019 (49.46)	
Feet exam				
No	1821 (50.08)	3897 (86.79)	5718 (70.37)	<0.0001
Yes	1815 (49.92)	593 (13.21)	2408 (29.63)	
Total	3636 (44.75)	4490 (55.25)	8126 (100.00)	

Table 3. Frequency of diabetes complications in Brazil and Mexico.

	Countries			
	Brazil	Mexico	Total	<i>P</i>
	n (%)	n (%)	n (%)	
Amputation				
No	3584 (98.57)	4410 (98.22)	7994 (98.38)	0.2125
Yes	52 (1.43)	80 (1.78)	132 (1.62)	
Coma				
No	3568 (98.13)	4366 (97.24)	7934 (97.64)	0.0085
Yes	68 (1.87)	124 (2.76)	192 (2.36)	
Dialysis				
No	3621 (99.59)	4438 (98.84)	8059 (99.18)	0.0002
Yes	15 (0.41)	52 (1.16)	67 (0.82)	
Leg ulcer				
No	3463 (95.24)	4204 (93.63)	7667 (94.35)	0.0018
Yes	173 (4.76)	286 (6.37)	459 (5.65)	
Myocardial infarction				
No	3497 (96.18)	4381 (97.57)	7878 (96.95)	0.0003
Yes	139 (3.82)	109 (2.43)	248 (3.05)	
Visual impairment				
No	2556 (70.30)	2397 (53.39)	4953 (60.95)	<0.0001
Yes	1080 (29.70)	2093 (46.61)	3173 (39.05)	
Any complication				
No	2416 (66.45)	2228 (49.62)	4644 (57.15)	<0.0001
Yes	1220 (33.55)	2262 (50.38)	3482 (42.85)	
Total	3636 (44.75)	4490 (55.25)	8126 (100.00)	

Table 4. Regression analysis and multiple logistic predictions for diabetes in adults and the elderly.

	Simple model		Adjusted model	
Term	OR (95% IC)	P-Value	OR (95% IC)	P-Value
Country (reference: Brazil)				
Mexico	2.01 (1.84-2.20)	<0.0001	3.04 (2.54-3.63)	<0.0001
Region (reference: Metropolitan)				
Interior	1.09 (0.98-1.22)	0.1049	1.11 (0.97-1.27)	0.1138
Rural	1.22 (1.09-1.36)	0.0004	1.22 (1.06-1.39)	0.0049
Sex (reference: Men)				
Women	1.03 (0.94-1.12)	0.5707	0.90 (0.80-1.01)	0.0791
Age (years)	1.01 (1.01-1.01)	<0.0001	1.00 (0.99-1.01)	0.4822
Time with Diabetes (reference < 5 years)				
5 - 10 years	1.52 (1.34-1.71)	<0.0001	1.39 (1.21-1.61)	<0.0001
10 - 15 years	2.11 (1.85-2.40)	<0.0001	1.94 (1.66-2.26)	<0.0001
15 years or more	2.72 (2.42-3.06)	<0.0001	2.47 (2.11-2.89)	<0.0001
Type of Medical care (reference: Private)				
Public	1.56 (1.38-1.76)	<0.0001	1.31 (1.13-1.52)	0.0003
Other	2.32 (0.99-5.47)	0.0538	3.13 (1.11-8.89)	0.0316
No medical care	0.53 (0.45-0.62)	<0.0001	0.93 (0.76-1.14)	0.4939
Diabetic treatment (reference: None)				
Only pills	2.06 (1.80-2.35)	<0.0001	1.20 (1.01-1.43)	0.0364
Only insulin	4.02 (3.18-5.08)	<0.0001	1.67 (1.25-2.24)	0.0005
Both	4.60 (3.80-5.56)	<0.0001	2.19 (1.70-2.81)	<0.0001
Silhouette (reference: normal weight)				
Underweight	1.78 (1.50-2.12)	<0.0001	1.46 (1.21-1.75)	0.0001
Overweight	0.98 (0.87-1.11)	0.7846	1.00 (0.88-1.13)	0.9676
Obese	0.77 (0.66-0.90)	0.001	1.05 (0.87-1.26)	0.6146
Physical exercise (reference: No)				
Yes	0.65 (0.57-0.73)	<0.0001	0.72 (0.62-0.85)	<0.0001
Alcohol (reference: No)				
At least monthly	0.68 (0.58-0.78)	<0.0001	0.85 (0.71-1.01)	0.0656
Less than monthly	0.91 (0.81-1.02)	0.1171	0.84 (0.74-0.97)	0.0162
Blood glucose (reference: No)				
Yes	1.48 (1.35-1.63)	<0.0001	1.53 (1.33-1.76)	<0.0001
Blood strips (reference: No)				
Yes	1.27 (1.16-1.39)	<0.0001	1.37 (1.21-1.55)	<0.0001
HbA1C (reference: No)				
Yes	0.93 (0.84-1.02)	0.1095	0.99 (0.83-1.17)	0.9046
Urinalysis (reference: No)				

Yes	1.35 (1.24-1.47)	<0.0001	1.28 (1.12-1.47)	0.0004
Feet exam (reference: No)				
Yes	1.22 (1.11-1.35)	<0.0001	1.26 (1.09-1.46)	0.0020
Cardiovascular (reference: No)				
Yes	1.19 (1.09-1.3)	0.0001	1.16 (1.04-1.30)	0.0086
Dyslipidemia (reference: No)				
Yes	1.40 (1.27-1.55)	<0.0001	1.54 (1.36-1.73)	<0.0001
Don't know	1.45 (1.27-1.65)	<0.0001	1.29 (1.10-1.51)	0.0021