

Health care among adults with self-reported diabetes mellitus in Brazil, National Health Survey, 2013

Cuidados em saúde entre portadores de diabetes mellitus autorreferido no Brasil, Pesquisa Nacional de Saúde, 2013

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ABSTRACT: *Objective:* To describe the care measurements provided to patients with self-reported diabetes mellitus in Brazil. *Methods:* Data from the Brazilian National Health Survey (2013) were used. This is a cross-sectional population-based study in which the subjects with self-reported diabetes mellitus answered questions concerning their use of health services and access to medicine. *Results:* The prevalence of self-reported diabetes mellitus was 6.2%, while 11.5% of the population had never undergone a glucose testing. From the adults with diabetes mellitus, 80.2% had taken medications two weeks before the interview, 57.4% used the Popular Pharmacy Program, 73.2% received medical care, and 47.1% were cared for in the Health Basic Units. In 65.2%, the physician who cared for them in the last appointment was the same from previous ones, 95.3% of the patients were able to perform the required complementary examinations, and 83.3% could go to the appointments with a specialist. About 35.6 and 29.1% of the subjects with diabetes mellitus reported feet and eyes examination, respectively. About 13.4% declared previous hospitalization owing to diabetes or any complications, and 7.0% mentioned limitations in their daily activities owing to the disease. In general, women and the elderly people, those with higher education levels, white, and those living in the south and southeastern regions showed a higher prevalence of the disease and greater access to services, medicine, and appointments. *Discussion:* The care reported by patients with diabetes, which is essential to maintain their quality of life and prevent serious outcomes, seemed, in most cases, to be adequate.

Keywords: Chronic disease. Diabetes mellitus. Health surveys. Health services. Delivery of health care. Prevalence.

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RESUMO: *Objetivo:* Descrever medidas do cuidado assistencial destinadas ao paciente com diabetes *mellitus* autorreferido no Brasil. *Métodos:* Foram utilizados dados da Pesquisa Nacional de Saúde (2013), estudo transversal de base populacional, referentes ao cuidado em saúde com o diabetes *mellitus* autorreferido, quanto ao uso de serviços de saúde e acesso a medicamentos. *Resultados:* A prevalência de diabetes *mellitus* autorreferido foi de 6,2%, e 11,5% da população nunca fez uma glicemia na vida. Dos adultos que referiram diabetes *mellitus*, 80,2% tomaram medicamentos nas duas semanas anteriores à entrevista, 57,4% usaram o Programa Farmácia Popular, 73,2% receberam assistência médica e 47,1% realizaram o atendimento nas Unidades Básicas de Saúde. Em 65,2%, o médico que atendeu na última consulta era o mesmo das consultas anteriores, 95,3% dos pacientes conseguiram realizar os exames complementares solicitados e 83,3% conseguiram fazer as consultas com o médico especialista. A avaliação de pés e olhos foi relatada por 35,6 e 29,1% dos portadores de diabetes *mellitus*, respectivamente. Relataram internação hospitalar por causa do diabetes ou de alguma complicação 13,4% dos adultos, e outros 7,0% relataram limitações nas atividades diárias. Em geral, mulheres, assim como a população mais idosa, de maior escolaridade, brancos e residentes nas regiões Sul e Sudeste, tiveram maior prevalência da doença e maior acesso aos serviços, medicamentos e consultas. *Discussão:* Os cuidados aos portadores de diabetes foram recebidos de forma adequada, na maioria dos casos, o que é essencial para manter a qualidade de vida dos pacientes e prevenir desfechos mais graves.

Palavras-chave: Doença crônica. Diabetes mellitus. Inquéritos epidemiológicos. Serviços de saúde. Assistência à saúde. Prevalência.

INTRODUCTION

Diabetes mellitus (DM) is a global health problem responsible for 1.5 million deaths in 2012 and 89 million of disability-adjusted life years (DALYS)¹, in which most of them are premature deaths that happen many times throughout a person's productive life. The World Health Organization estimates that diabetes will be the seventh largest worldwide cause of deaths in 2030¹.

In Brazil, diabetes mortality rate in people aged from 30 to 69 years, in 2012, was of 26.9/100,000 residents (57,876 deaths)². If multiple causes of the death certificate (DC) are considered, this rate might increase³, because cardiovascular and cerebrovascular diseases can be associated with diabetes⁴.

DM increase is attributed to a combination of factors, such as population aging, fast urbanization, adoption of unhealthy lifestyles (sedentarism, sugar, fat, and calorie-rich food), and consequent increase of excess weight and obesity^{1,5-7}, besides the higher survival of patients^{1,8}. There is also an important increase in the number of people that look for and use health services, reflecting on DM economical and social costs.

Costs with DM might reach 15% of the annual health budget of a country⁹. Estimates of the annual total cost of care with the diseased subject in Brazil reach more than two thousand dollars per patient, considering direct (medicine, tests, procedures and supplies, professional visits, and hospital expenses in emergency services, besides nonmedical expenses such as transportation and purchase of dietetic products) and indirect costs (absence at work, loss of productivity, and early retirement)¹⁰.

Surveys that include questions about self-reported diabetes from the early disease diagnosis by a physician have provided estimates of diabetes valid prevalence¹¹⁻¹³, working as the population prevalence proxy. In 2013, the Brazilian National Health Survey (NHS) included several questions concerning self-reported diabetes and access to care measurements, which enable the assessment of aspects associated with care received by DM subjects.

This study aimed at describing care measurements that have been provided to patients with self-reported DM in Brazil.

METHODS

This is a cross-sectional study that applies data from the Brazilian NHS conducted in 2013, which is a home survey using a three-stage cluster sampling. The census sectors or a combination of sectors were the sampling primary units (SPUs); homes were the second-stage units; and residents aged 18 years or older were the third-stage units. A fixed number of private homes in each census sector was established through simple randomized sampling⁵.

Within each home, from the list of residents developed in the interview, a resident aged 18 years or older was chosen to answer a specific questionnaire⁵. The selected sample was composed of 81,357 domiciles, among which 69,994 were occupied and, therefore, eligible for the investigation. With an 8.1% nonresponse rate, the information was collected in 64,348 homes. More details about the methodology can be seen in specific publications^{5,14}.

Indicators concerning DM were described as to the access and use of services, access to medications, health, and prevention promotion measurements (Chart 1). The indicators were classified according to gender, age groups, race/skin color, and educational level for Brazil and specific macroregions. For data analysis, expansion factors or sample weights were used for the SPUs, the domiciles and all the residents, and for the chosen resident⁵. Indicators were presented through the prevalence and its respective 95%CI, and the differences between the strata were assessed through the 95%CI interposition.

The Research Ethics National Committee approved the NHS project in June 2013, under protocol number 328.159.

RESULTS

Table 1 presents the synthesis of indicators on the presence of diabetes and care associated with the disease in Brazil and in large areas. About 6.2% of the participants, with lower percentages in the north (4.3%) and northeastern (5.4%) regions of the country (Table 1), reported medical diagnosis of DM. About 11.5% of the interviewed subjects mentioned that they never took a test to measure blood glucose.

Chart 1. Questions used and indicators. National Health Survey, 2013.

Indicator Proportion (%) of people aged \geq 18 years who:	Questions and answers provided
1. Have never measured their blood glucose level	Q29. When was the last time you took a blood test to measure your glycemia level, i.e., sugar on your blood? Answer option: he/she has never taken it.
2. Have mentioned medical diagnosis of diabetes	Q30. Has any physician given you a diabetes diagnosis? Answer option: yes.
2.1 % of those who had an oral medicine or insulin in the last two weeks before the survey	Q34. In the last two weeks, owing to diabetes, did you: (a) take oral medication to lower your sugar levels? (b) use insulin? Answer options: yes, for both answers.
2.1.1 ...and took at least one medication for DM in the Programa Farmácia Popular [Popular Pharmacy Program]	Q36. Has any of the diabetes medication or the insulin been obtained in the Popular Pharmacy Program (PPP)? Answer option: yes.
2.2 ... and received medical care for DM in the last 12 months	Q39. When was the last time you received medical care owing to diabetes? Answer option: less than six months ago; between six months and less than a year.
2.2.1 ...and were in their last appointment in the health basic unit	Q40. In the last time you received medical care for diabetes, where have you been cared for? Answer option: Health basic unit (Free Clinic or Health center or family health unit).
2.2.2 ...and the physician who cared for them in the last appointment was the same from previous appointments	Q44. In your last appointment, was the physician who took care of you the same from previous appointments? Answer option: yes.
2.2.3 ... and complementary examinations were requested and could perform all the requested examinations	Q47. Was any examination requested in the diabetes appointments? Q48. Have you done all the requested examinations? Answer option: yes, for both.
2.2.4 ... and were sent for an appointment with a specialist and could go to all appointments with a specialized physician	Q50. Was there a request for an appointment with a specialist, such as cardiologist, endocrinologist, nephrologist, or ophthalmologist, in any of the diabetes appointments? Q51. Have you gone to all appointments with a specialist? Answer option: yes, for both.
2.3 ... and were hospitalized owing to DM or other complication	Q56. Have you ever been hospitalized owing to diabetes or any other complication? Answer option: yes.
2.4 ...and had their feet examined in the last 12 months	Q54. When was the last time a physician or a health professional examined your feet to check the sensibility or presence of injuries or irritations? Answer option: less than six months ago; from six months to less than a year.
2.5 ...and performed eye examination in the last 12 months	Q53. When was the last time an eye examination was performed on you or did you have your pupils dilated? Answer option: less than six months ago; from six months to less than a year.
2.6 ... and have a severe or very severe degree of limitations in their daily activities owing to diabetes or some kind of complication	Q58. In general, in what level does your diabetes or any diabetes complication limit your daily activities (like working, doing chores, and so on)? Answer options: intensely, very intense.

Table 1. Indicators of diabetes care in Brazil and macroregions. Brazil, 2013.

Indicator	Macroregions											
	Brazil		North		Northeast		Southeast		South		Mid-West	
	%	95%CI	%	95%CI	%	95%CI	%	95%CI	%	95%CI	%	95%CI
I have never taken an examination to measure my blood glucose level	11.5	11.0 – 12.0	18.3	16.6 – 19.9	14.6	13.6 – 15.5	7.9	7.0 – 8.7	12.3	10.9 – 13.7	13.9	12.7 – 15.1
Medical diagnosis of diabetes	6.2	5.9 – 6.6	4.3	3.6 – 4.9	5.4	4.9 – 5.8	7.1	6.4 – 7.7	6.2	5.4 – 7.0	6.5	5.8 – 7.1
Among patients with medical diagnosis of diabetes, the percentage of those who/whose:												
...took oral medicine or insulin in the last two weeks	80.2	78.0 – 82.5	74.1	67.0 – 81.2	76.0	71.7 – 80.4	84.6	81.1 – 88.1	76.5	70.3 – 82.6	75.4	70.4 – 80.3
... obtained at least one diabetes medicine in the Programa Farmácia Popular [Popular Pharmacy Program]	57.4	54.2 – 60.6	48.7	40.4 – 56.9	59.5	54.8 – 64.2	57.6	52.3 – 62.9	54.5	47.2 – 61.7	61.1	55.0 – 67.2
...received medical care for diabetes in the last 12 months	73.2	70.5 – 76.0	76.2	70.2 – 82.1	67.8	63.1 – 72.5	75.5	70.9 – 80.0	72.2	65.1 – 79.3	74.6	69.6 – 79.5
...were in their last appointment in the Health Basic Unit	47.1	43.9 – 50.4	51.0	40.9 – 61.1	45.3	40.0 – 50.6	46.0	40.5 – 51.5	49.6	42.6 – 56.6	52.7	46.3 – 59.1
...physician that cared for them in the last appointment was the same from previous appointments	65.2	62.2 – 68.2	57.6	50.2 – 65.1	58.9	53.5 – 64.3	66.6	61.7 – 71.5	72.9	66.4 – 79.4	64.2	58.5 – 70.0
...could take all the required examinations	95.3	94.2 – 96.4	86.7	78.4 – 95.1	91.1	88.3 – 94.0	96.4	94.9 – 97.9	99.1	98.3 – 99.8	97.8	96.3 – 99.4
...were sent and could take an appointment with a specialist	83.3	78.7 – 87.9	89.8	79.7 – 99.9	76.8	68.5 – 85.1	83.7	76.7 – 90.8	84.8	74.5 – 95.1	91.5	85.1 – 97.9
...took an eye exam in the last 12 months	35.6	32.8 – 38.3	33.3	25.1 – 41.4	27.4	23.6 – 31.1	40.7	36.0 – 45.4	34.9	28.3 – 41.5	29.3	24.3 – 34.4
...had their feet examined in the last 12 months	29.1	26.4 – 31.8	31.9	22.7 – 41.2	22.1	18.2 – 26.0	33.8	29.3 – 38.3	28.4	22.2 – 34.5	18.9	14.3 – 23.4
...were hospitalized owing to diabetes or any other complication	13.4	11.4 – 15.3	14.2	5.0 – 23.3	15.7	12.3 – 19.1	12.1	9.0 – 15.1	13.6	8.9 – 18.3	13.5	9.8 – 17.2
...have a severe/very severe degree of limitations in the daily activities owing to diabetes or complication	7.0	5.5 – 8.5	7.3	2.0 – 12.6	8.6	5.9 – 11.3	6.3	4.0 – 8.7	7.7	3.6 – 11.8	5.5	3.3 – 7.8

Source: National Health Survey, 2013.

About 80% of subjects with diabetes reported the use of oral hypoglycemic agents and/or insulin, with a higher percentage in the southeastern region (84.6%) when compared with north-eastern (76%) and mid-western (75.6%) regions. The *Programa Farmácia Popular* [Popular Pharmacy Program] was the source of drug acquisition for 57.4% of the participants (Table 1).

From the 73.2% referring diabetes and those who received medical care in the last 12 months, 47.1% had their last appointment in a Health Basic Unit (HBU); the same physician from the previous appointments conducted it for 65.2%. Appointment frequency performed by the same doctor was significantly higher in the southern region (72.9%) when compared with the northeastern region (58.9%).

More than 95% of those who needed additional examinations reported on being able to take them (Table 1). This rate reaches 99% in the southern region. With regard to a specialist visit, 83.3% referred being able to go to all the necessary appointments. This percentage reached 91.5% in the midwestern region. About 35.6 and 29.1% of the subjects had their eyes and feet examined 12 months before the interview, respectively. About 13.4% of the patients with DM reported hospitalization, and 7.0% of the DM subjects mentioned a severe or very severe degree of limitations in their daily activities.

As to gender, Table 2 shows a higher proportion of men (15.8%) than women (7.8%) who have never taken an examination to measure blood glucose. The disease diagnosis was more frequent in the female sex (7.0 versus 5.4%). Use of medicine to control DM was reported more by men (81.2%). Hospitalizations were mentioned by 15% of the men and 12.2% of women. The severe/very severe level of limitations in daily activities was mentioned by 6.6% of men and 7.4% of women.

With regard to age range, the percentage of subjects who said they never took a blood glucose test was higher in the age group of 18 to 29 years (19.4%), with a progressive decrease until the age group of 65 to 74 years. Diabetes diagnosis increases progressively with growth, from 0.6% between 18 and 29 years to around 20% in the 65-year-old population. The use of oral medicine and/or insulin for diabetes was mostly reported by people with diabetes aged 65 to 74 years old when compared with those aged 18 to 59 years old (Table 3).

Table 4 introduces the indicators for educational level. The proportion of people who have never taken a blood glucose test was higher (14.2%) in the group with lower educational level, which is in contrast with 2.9% among those with higher education. Diabetes diagnosis was reported by 9.6% of the adults who did not finish middle school, and it decreased with higher educational level. Use of diabetes drugs was higher in the group with higher educational level (90.8%), whereas the drug acquisition through *Programa Farmácia Popular* was more usual in the groups with lower educational level (63.9%). Subjects with a lower educational level showed more appointments in a HBU. The performance of eye and feet tests 12 months before the interview was more common among those with higher educational level. Subjects with lower educational level presented more hospitalization frequency and more reports of severe/very severe limitation level (Table 4).

Diabetes diagnosis was less frequent in mulatto skin subjects than in those who reported being white. Black skin subjects were the ones who most acquired drugs in *Farmácia Popular* (69.4%), and the mulatto ones showed more appointments in the HBU (Table 5).

Table 2. Indicators of diabetes care stated by the Brazilian population, according to sex. Brazil, 2013.

Indicator	Total		Sex			
			Male		Female	
	%	95%CI	%	95%CI	%	95%CI
I have never taken an examination to measure my blood glucose level	11.5	11.0 – 12.0	15.8	14.9 – 16.6	7.8	7.3 – 8.2
Medical diagnosis of diabetes	6.2	5.9 – 6.6	5.4	4.8 – 5.9	7.0	6.5 – 7.5
Among patients with medical diagnosis of diabetes, the percentage of those who/whose:						
...took oral medicine or insulin in the last two weeks	80.2	78.0 – 82.5	81.2	77.6 – 84.7	79.6	76.6 – 82.5
...obtained at least one diabetes medicine in the Programa Farmácia Popular [Popular Pharmacy Program]	57.4	54.2 – 60.6	54.9	49.2 – 60.7	59.1	55.5 – 62.8
...received medical care for diabetes in the last 12 months	73.2	70.5 – 76.0	72.8	68.1 – 77.5	73.5	70.2 – 76.8
...were in their last appointment in the Health Basic Unit	40.5	36.4 – 44.6	34.9	28.4 – 41.5	44.4	39.4 – 49.4
...physician that cared for them in the last appointment was the same from previous appointments	65.2	62.2 – 68.2	64.9	59.8 – 70.0	65.4	62.0 – 68.9
...could take all the required examinations	95.3	94.2 – 96.4	96.2	94.8 – 97.6	94.6	93.1 – 96.2
...were sent and could take an appointment with a specialist	83.3	78.7 – 87.9	83.2	75.7 – 90.7	83.3	77.7 – 88.9
...took an eye examination in the last 12 months	35.6	32.8 – 38.3	38.3	33.4 – 43.2	33.7	30.5 – 36.9
...had their feet examined in the last 12 months	29.1	26.4 – 31.8	32.1	27.4 – 36.9	27.1	23.9 – 30.2
...were hospitalized owing to diabetes or any other complication	13.4	11.4 – 15.3	15.0	11.6 – 18.4	12.2	10.0 – 14.4
...have a severe/very severe degree of limitations in the daily activities owing to diabetes or complication	7.0	5.5 – 8.5	6.6	4.1 – 9.0	7.4	5.5 – 9.2

Source: National Health Survey, 2013

Table 3. Indicators of diabetes care stated by the Brazilian population, according to age groups. Brazil, 2013.

Indicator	Total		Age groups									
			18 to 29 years old		30 to 59 years old		60 to 64 years old		65 to 74 years old		75 years old or older	
	%	95%CI	%	95%CI	%	95%CI	%	95%CI	%	95%CI	%	95%CI
I have never taken an examination to measure my blood glucose level	11.5	11.0 – 12.0	19.4	18.1 – 20.6	9.9	9.3 – 10.5	6.6	5.0 – 8.2	4.2	3.4 – 4.9	4.8	3.3 – 6.4
Medical diagnosis of diabetes	6.2	5.9 – 6.6	0.6	0.4 – 0.8	5.0	4.6 – 5.5	14.5	12.5 – 16.4	19.9	17.9 – 22.0	19.6	17.1 – 22.1
Among patients with medical diagnosis of diabetes, the percentage of those who/whose:												
...took oral medicine or insulin in the last two weeks	80.2	78.0 – 82.5	59.5	42.2 – 76.8	78.0	74.7 – 81.3	81.3	74.6 – 87.9	85.9	81.9 – 90.0	79.8	73.5 – 86.2
...obtained at least one diabetes medicine in the Programa Farmácia Popular [Popular Pharmacy Program]	57.4	54.2 – 60.6	65.2	42.6 – 87.8	61.6	56.8 – 66.5	53.7	46.5 – 60.8	61.3	55.0 – 67.6	39.9	32.0 – 47.9
...received medical care for diabetes in the last 12 months	73.2	70.5 – 76.0	68.7	53.9 – 83.4	74.9	70.8 – 78.9	70.9	63.7 – 78.0	75.4	70.3 – 80.5	67.1	60.2 – 74.1
...were in their last appointment in the Health Basic Unit	47.1	43.9 – 50.4	36.8	18.4 – 55.1	48.8	43.9 – 53.7	50.7	43.5 – 57.9	51.2	44.8 – 57.6	32.6	25.7 – 39.6
...physician that cared for them in the last appointment was the same from previous appointments	65.2	62.2 – 68.2	65.1	45.8 – 84.3	63.5	58.8 – 68.1	62.2	54.5 – 69.9	67.3	61.3 – 73.3	69.8	62.4 – 77.2
...could take all the required examinations	95.3	94.2 – 96.4	85.7	69.7 – 101.7	94.6	92.9 – 96.3	96.4	94.1 – 98.7	96.6	95.1 – 98.2	95.6	92.4 – 98.8
...were sent and could take an appointment with a specialist	83.3	78.7 – 87.9	80.5	57.8 – 103.3	81.6	74.7 – 88.5	79.3	66.1 – 92.6	85.2	75.7 – 94.6	92.0	84.9 – 99.1
...took an eye examination in the last 12 months	35.6	32.8 – 38.3	28.8	12.7 – 44.9	35.4	31.2 – 39.6	30.7	24.8 – 36.7	42.1	36.1 – 48.0	30.5	23.7 – 37.3
...had their feet examined in the last 12 months	29.1	26.4 – 31.8	21.1	3.8 – 38.5	27.6	23.7 – 31.4	25.5	19.8 – 31.2	29.9	24.4 – 35.5	37.2	29.8 – 44.6
...were hospitalized owing to diabetes or any other complication	13.4	11.4 – 15.3	28.6	10.4 – 46.8	13.5	10.6 – 16.5	15.0	10.0 – 20.1	8.6	6.0 – 11.2	16.7	10.8 – 22.7
...have a severe/very severe degree of limitations in the daily activities owing to diabetes or complication	7.0	5.5 – 8.5	16.3	0.0 – 34.2	7.3	5.0 – 9.7	4.4	2.0 – 6.8	4.7	2.9 – 6.6	11.0	6.1 – 15.9

Source: National Health Survey, 2013

Table 4. Indicators of diabetes care stated by the Brazilian population, according to the education level. Brazil, 2013.

Indicator	Total		Education							
			Without educational level and incomplete middle school		Complete middle school and incomplete high school		Complete high school and incomplete higher education		Complete Higher Education	
	%	95%CI	%	95%CI	%	95%CI	%	95%CI	%	95%CI
I have never taken an examination to measure my blood glucose level	11.5	11.0 – 12.0	14.2	13.4 – 15.1	15.7	14.3 – 17.0	9.7	8.9 – 10.4	2.9	2.3 – 3.5
Medical diagnosis of diabetes	6.2	5.9 – 6.6	9.6	9.0 – 10.2	5.4	4.4 – 6.3	3.4	3.0 – 3.9	4.2	3.3 – 5.1
Among patients with medical diagnosis of diabetes, the percentage of those who/whose:										
...took oral medicine or insulin in the last two weeks	80.2	78.0 – 82.5	77.6	74.5 – 80.7	83.0	77.5 – 88.4	81.8	76.9 – 86.7	90.8	87.0 – 94.7
...obtained at least one diabetes medicine in the Programa Farmácia Popular [Popular Pharmacy Program]	57.4	54.2 – 60.6	63.9	60.2 – 67.7	53.7	43.6 – 63.8	53.2	45.7 – 60.8	31.7	21.6 – 41.7
...received medical care for diabetes in the last 12 months	73.2	70.5 – 76.0	72.1	68.6 – 75.5	70.8	61.2 – 80.3	76.2	70.6 – 81.7	78.7	71.1 – 86.4
...were in their last appointment in the Health Basic Unit	47.1	43.9 – 50.4	56.2	52.4 – 60.0	45.7	37.2 – 54.3	36.2	28.2 – 44.1	10.4	4.7 – 16.2
...physician that cared for them in the last appointment was the same from previous appointments	65.2	62.2 – 68.2	63.6	60.2 – 67.0	63.2	55.1 – 71.4	69.3	62.4 – 76.3	70.4	59.6 – 81.2
...could take all the required examinations	95.3	94.2 – 96.4	94.4	92.9 – 96.0	95.5	93.0 – 97.9	96.3	93.8 – 98.8	98.4	96.7 – 100.2
...were sent and could take an appointment with a specialist	83.3	78.7 – 87.9	80.3	73.8 – 86.7	87.4	79.2 – 95.7	84.9	75.1 – 94.7	90.9	79.6 – 102.1
...took an eye examination in the last 12 months	35.6	32.8 – 38.3	31.8	28.5 – 35.1	36.7	28.3 – 45.0	41.1	33.8 – 48.4	48.5	37.8 – 59.1
...had their feet examined in the last 12 months	29.1	26.4 – 31.8	27.0	23.6 – 30.3	28.1	20.0 – 36.2	31.5	25.2 – 37.7	40.5	30.4 – 50.7
...were hospitalized owing to diabetes or any other complication	13.4	11.4 – 15.3	14.9	12.3 – 17.4	13.1	7.3 – 18.9	12.2	7.8 – 16.6	5.4	2.3 – 8.5
...have a severe/very severe degree of limitations in the daily activities owing to diabetes or complication	7.0	5.5 – 8.5	8.2	6.2 – 10.1	9.0	3.8 – 14.2	4.4	1.3 – 7.5	1.4	0.2 – 2.7

Source: National Health Survey, 2013

Table 5. Indicators of diabetes care stated by the Brazilian population, according to reported race/skin color. Brazil, 2013.

Indicators	Total		Skin color					
			White		Black		Brown	
	%	95%CI	%	95%CI	%	95%CI	%	95%CI
I have never taken an examination to measure my blood glucose level	11.5	11.0 – 12.0	8.5	7.9 – 9.1	12.9	11.3 – 14.4	14.7	13.9 – 15.5
Medical diagnosis of diabetes	6.2	5.9 – 6.6	6.7	6.1 – 7.2	7.2	5.8 – 8.5	5.5	5.1 – 5.9
Among patients with medical diagnosis of diabetes, the percentage of those who/whose:								
...took oral medicine or insulin in the last two weeks	80.2	78.0 – 82.5	82.5	79.5 – 85.6	79.8	73.1 – 86.5	76.8	73.1 – 80.6
...obtained at least one diabetes medicine in the Programa Farmácia Popular [Popular Pharmacy Program]	57.4	54.2 – 60.6	53.5	48.7 – 58.2	69.4	60.8 – 77.9	59.6	54.9 – 64.2
...received medical care for diabetes in the last 12 months	73.2	70.5 – 76.0	75.9	72.2 – 79.6	71.9	61.0 – 82.8	70.4	66.4 – 74.5
...were in their last appointment in the Health Basic Unit	47.1	43.9 – 50.4	42.9	38.0 – 47.8	47.6	39.3 – 56.0	53.3	48.5 – 58.1
...physician that cared for them in the last appointment was the same from previous appointments	65.2	62.2 – 68.2	67.8	63.6 – 72.1	67.9	60.9 – 74.8	60.3	55.7 – 65.0
...could take all the required examinations	95.3	94.2 – 96.4	97.6	96.6 – 98.7	91.6	86.8 – 96.3	93.0	90.9 – 95.2
...were sent and could take an appointment with a specialist	83.3	78.7 – 87.9	85.5	79.1 – 92.0	80.1	65.8 – 94.3	81.4	74.2 – 88.6
...took an eye examination in the last 12 months	35.6	32.8 – 38.3	40.6	36.4 – 44.8	32.5	24.6 – 40.3	29.6	26.0 – 33.3
...had their feet examined in the last 12 months	29.1	26.4 – 31.8	32.9	28.9 – 36.8	25.4	17.7 – 33.1	25.1	21.4 – 28.9
...were hospitalized owing to diabetes or any other complication	13.4	11.4 – 15.3	11.7	9.0 – 14.4	16.1	9.6 – 22.5	15.2	12.1 – 18.3
...have a severe/very severe degree of limitations in the daily activities owing to diabetes or complication	7.0	5.5 – 8.5	5.4	3.5 – 7.4	9.2	4.1 – 14.4	8.7	6.1 – 11.3

Source: National Health Survey, 2013

DISCUSSION

Results from the NHS showed that a great majority of adults had already measured their blood glucose level. About 6.2% of the adult population who referred diabetes diagnosis represented a population contingent of 9.1 million subjects with diabetes⁵. About 70% received medical care in the last year and four-fifth were under drug treatment, with more than half of them receiving their drugs through *Programa Farmácia Popular*. The appointment was in the HBU for around 45% of the subjects who were taken care for DM, and in most of them, the physician in the last appointment was the same from previous ones. Almost all the patients could do the required examinations, and the majority of patients could go to all the appointments with a specialist. However, only 40 and 30% underwent an examination in the last year for their eyes and feet, respectively. Hospitalization owing to DM or other complication was seen in 13.4%, and other 7.0% reported limitations in their daily activities. Women and the older population, of higher educational level, white subjects, and residents living in the southern and southeastern regions declared more diagnosis and more access to medications and appointments.

As blood glucose performance is essential to diagnose diabetes, the results were in agreement. They show that the northern region, with a higher percentage of people who have never taken the test, was also the region that presented the lowest percentage of diagnosed disease. Similarly, the southeastern region showed the highest prevalence of diagnosis and the lowest number of subjects who have never taken the test. Similar results concerning the regional distribution were seen in the telephonic survey called *Vigitel*¹¹ and in other studies of national scope^{15,16}. These differences might be associated with availability and distance from health services (more access in the south and southeastern regions) and with sociodemographic and nutritional characteristics of each studied population (younger populations in the northeastern and northern of the country, for example)¹⁷.

For most of the indicators associated with health care, the southeastern region showed more prevalence, differently from the north and northeastern regions, although there were higher variations between the regions. This could happen, in part, because the health assistance and care depend not only on the availability of these services but also on the population understanding and their own acceptance of the disease, linked to the educational level of the population¹⁸.

Decrease in the percentage of people who have never taken a blood glucose level, age advance, and increase in the percentage of people who mentioned diabetes are justified results, owing to the disease chronic characteristic and the national¹⁹ and international²⁰ guidelines to track the disease after 45 years old, in the absence of known risk factors.

Diabetes medical diagnosis and the percentage of people who could never be diagnosed through glycemia measurement were equally higher among those with lower educational level. Thus, even with lower access to diagnosis, this group seems to be more vulnerable to the occurrence of the disease. Brazilian studies using data from the Home Sample National

Survey (PNAD) had already seen the existence of a social gradient in the occurrence of chronic diseases, with a higher prevalence among the population with lower educational level and income^{16,21}.

We must also consider that a low educational level is usually focused on the older population, which could influence on the found disease frequency²¹. In addition, the educational level, as a socioeconomic level proxy, is associated with differences in the access to health promotion practices such as healthy food, physical activity, and more access to health services²¹⁻²³.

The protocol for appointments from the Brazilian Department of Health for basic attention preconizes an annual medical appointment for diabetes¹⁹, which has been achieved in more than 80% of the people with diabetes. Appointment access was high and without variation as per sex, age, educational level, race/color, but with some regional variations: lower access in the northeastern region, and higher in the southeastern region. Access to specialists and examinations was also high; thus, the Unified Health System (SUS) has been favoring equity in the access to health care²⁴.

The Brazilian Department of Health recommends that every person with DM take a feet examination annually, with the aim of finding risk factors for ulcer and amputation¹⁹. Similarly, retinopathy tracking must begin in the moment of type 2 diabetes diagnosis and after five years of type 1 diabetes, and it should be done every year^{19,20}. Retinopathy is first asymptomatic, and its detection requires the performance of eye deep testing. These were the critical points of care provided to DM bearers: only 1/3 reported feet examination, whose frequency was even lower among mulatto color bearers, and only 35.6% took the ophthalmological assessment in the last year before the interview, with lower percentages among the less-educated subjects. Such frequencies were very below the results found for the North American population in the 2007–2010 period, when more than 70% of the diabetes patients reported annual examination of feet and eye²⁵.

The fact that the frequency of hospitalizations and limitations from the disease was higher among the less-educated people can be a reflex of the biggest difficulties of disease acceptance and adhesion to treatment of this group²⁶, especially in the previous years. However, lower use of drugs, even today, in this group, indicates the need of more attention to this population stratum in strategies to promote health. Access to diagnose and specialized services, such as performance of additional examinations, seems to be a facilitator for the white adults, which could be associated with the population socioeconomic level.

In general, hospitalizations happened in the presence of DM complications²⁷⁻²⁹. In Brazil, from 2008 and 2010, DM reached around 1.3 million hospitalizations in the public network; thus, it is responsible for 8 to 12% of the hospital expenses from SUS. Of the total, 10.6% of hospitalizations were owing to diabetes itself, and 36.6% were associated with chronic complications of the disease²⁹. The NHS showed that 13.4% of those who mentioned diabetes had already been hospitalized, and this frequency tended to be higher in younger, less educated, and nonwhite men.

The higher proportion of people referring hospitalization and limitations in their daily activities owing to the disease or its complications in the younger group reinforces the impact of the disease in quality of life, mainly, among subjects at productive age, thus affecting the aptitude to work^{10,27}. This finding might also be related to the occurrence of type 1 diabetes, which brings changes to younger people's lifestyle, especially, through the disease acute symptoms²⁰ or even the possibility of lower adhesion to care practices among the younger subjects, as it is pointed out in a North American study²⁵. In a study about disease load conducted in 2009, on the other hand, the higher proportion of DALYs was seen among adults aged 45 to 69 years, despite the lower time of life to be lost by this age range²⁸. Furthermore, disease complications and hospitalizations would be more expected in the population with worse glycemic control and more disease time^{19,27}.

The NHS also indicated the percentage of diabetics who used drugs two weeks before the interview in about 80%. Although the disease diagnosis is more frequent in women, the use of drugs tends to be higher among men. The higher search of women for health services, already reported in literature²¹, is in agreement to the lower percentage of not taking blood glucose testing, which can favor the female gender with an early diagnosis and, therefore, with the adoption of nonpharmacological measurements to control the disease, contrary to men. Similarly, lower use of drugs among younger adults (18 to 29 years) is possibly associated with a more recent diagnosis and a less-advanced disease, which are situations that favor the control through nonpharmacological measurements such as diet and physical activity. In diabetes treatment, non-pharmacological measurements can or cannot be complemented with drugs (oral hypoglycemic agent and, if necessary, insulin)^{19,30}.

The SUS distributed free medicine in the health basic network, including diabetes medications such as hypoglycemic agents, insulins, and inputs such as ribbons for glycemia and glycosuria. In 2011, the *Programa Farmácia Popular* in Brazil started to distribute free medicine for noncommunicable chronic diseases (hypertension, diabetes, and asthma), which can also help the access to these drugs³¹. Although the NHS has seen a high access to drugs through population, mainly among the most educated ones, more than 50% of them used the *Programa Farmácia Popular*, more frequently among the less-instructed adults and nonwhite ones; these results are similar to other studies^{32,33}. The medicine acquisition for diabetes with more frequency among the less-educated subjects characterizes one of the program objectives, which is to provide the population with lower social conditions and free access to treatment³¹. A study performed in Campinas, in 2008, had already highlighted this relation³³. Similarly, the HBU is more searched by the population with less educational level and nonwhite, thus reinforcing the role of SUS and basic attention in equity of care. Initial results from the National Survey about Access, Use, and Promotion of Rational Use of Drugs in Brazil (PNAUM), also conducted in 2013, indicated that 61% of diabetes medications were obtained in the SUS network and 18% through the *Programa Farmácia Popular*³⁴.

This is a study based on questionnaire data, which is an important limitation; therefore, control data of risk factors and larger measurements of health promotion were not assessed at this moment. Thus, its focus is restricted to care process. Studies in other countries, based on national surveys of health with several clinical and laboratorial examinations²⁵, can go beyond process questions to compare clinical outcomes with previously established goals of care. In addition, diabetes diagnosis data and received care were self-reported by the interviewed participants; therefore, they are subject to report biases and depend on the disease acknowledgement by the subjects. Future analyses might be carried out to compare the reported and measured DM, because the NHS has also done biochemistry measurements in a subsample with the glycated hemoglobin (HbA1c)⁵.

CONCLUSION

The study including data from the NHS allowed describing a panorama of diagnosis and care associated with DM in Brazil. Estimates point out that 1 in each of the 15 adults in Brazil reveal diabetes diagnosed by a physician.

Given the wide expansion of the public basic attention networks and health plans, access and coverage are possibly much larger than in previous years and indicate advances in diabetes care, although there are still some important challenges.

The small differences seen between population strata concerning the received health care emphasize the role of SUS in minimizing health inequities. It is important to also emphasize that the engagement of chronic disease bearers in their care is essential to maintain patients' quality of life and to prevent more severe outcomes¹⁹. Favorable outcome in the glycemic control comes from the interaction of factors, such as motivation and adhesion of patients, of the counseled and received treatment, and of the organization and access to health services. The actions from the Plan of Actions to Fight Noncommunicable Chronic Diseases (2011-2022)³¹, with surveillance measurements, health promotion, protocols for full attention to diabetes patients, besides free drugs for noncommunicable chronic diseases, are essential to fight diabetes in Brazil.

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