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Tendency of use and sources for obtaining oral antidiabetic drugs for treatment of diabetes in Brazil from 2012 to 2018: analysis of the Vigitel survey

Tendência do uso e fontes de obtenção de antidiabéticos orais para tratamento de diabetes no Brasil de 2012 a 2018: análise do inquérito Vigitel

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ABSTRACT: ***Objective:*** To estimate the prevalence of use of oral medications for the treatment of diabetes, as well as the distribution of sources for obtaining according to sociodemographic variables, in the Brazilian states' capitals and in the Federal District, and their evolution from 2012 to 2018. ***Methods:*** Cross-sectional and population-based study with individuals aged ≥ 20 years who reported a medical diagnosis of diabetes, interviewed through Vigitel from 2012 to 2018. We estimated the prevalence of use and the distribution of sources for obtaining according to sociodemographic variables (95%CI). We checked differences among proportions using the Pearson's χ^2 test (Rao-Scott), with a significance level of 5%. ***Results:*** There was an increase in the prevalence of use of oral medications for the treatment of diabetes from 77.4 to 85.2% between 2012 and 2018, and a decrease in obtaining in the Health Unit Pharmacies of the Unified Health System (SUS), while there was an increase in obtaining in Popular Pharmacies. ***Conclusions:*** In Brazil, SUS remained the main source for obtaining oral antidiabetic drugs, financing more than 70% of them in the country, considering the Health Unit Pharmacies and Popular Pharmacies, thereby showing the importance of public Pharmaceutical Policies in guaranteeing the access to medications by the Brazilian population, as well as in reducing inequities in the country. Nevertheless, the migration of obtaining by users from SUS Health Units to Popular Pharmacies suggests the weakening the responsibility of Primary Health Care in the provision oral antidiabetic drugs, thereby undermining the bond and the longitudinal care.

Keywords: Drug utilization. Diabetes *mellitus*. Behavioral risk factor surveillance system. Unified Health System. Cross-sectional studies.

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RESUMO: ***Objetivo:*** Estimar as prevalências de uso de medicamento oral para tratamento de diabetes, bem como a distribuição das fontes de obtenção segundo variáveis sociodemográficas, nas capitais dos estados brasileiros e no Distrito Federal e sua evolução no período de 2012 a 2018. ***Métodos:*** Estudo transversal de base populacional com indivíduos de 20 anos ou mais que referiram diagnóstico médico de diabetes, entrevistados pelo Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico (Vigitel) de 2012 a 2018. Estimaram-se a prevalência de uso e a distribuição das fontes de obtenção segundo variáveis sociodemográficas (IC95%). Verificaram-se as diferenças entre as proporções pelo teste χ^2 de Pearson (Rao-Scott), com nível de significância de 5%. ***Resultados:*** Houve aumento na prevalência de uso de medicamento oral para tratamento de diabetes de 77,4 para 85,2%, entre 2012 e 2018, e diminuição da obtenção nas farmácias de unidade de saúde do Sistema Único de Saúde (SUS) com aumento da obtenção nas farmácias populares. ***Conclusões:*** O SUS manteve-se como a principal fonte de obtenção de antidiabéticos orais no Brasil, financiando mais de 70% dos medicamentos orais para tratamento de diabetes no país, considerando as farmácias de unidades de saúde e as farmácias populares, mostrando, assim, a importância das políticas farmacêuticas públicas na garantia do acesso a medicamentos pela população brasileira e na diminuição das iniquidades no país. Contudo a migração da obtenção pelos usuários nas unidades de saúde do SUS para as farmácias populares sugere enfraquecimento da responsabilidade da atenção primária à saúde na oferta de medicamentos antidiabéticos orais, fragilizando o vínculo e o cuidado longitudinal.

Palavras-chave: Uso de medicamentos. Diabetes *mellitus*. Sistema de vigilância de fator de risco comportamental. Sistema Único de Saúde. Estudos transversais.

INTRODUCTION

The global prevalence of diabetes, which was 4.6% in 2000, reached 9.3% in 2019, representing 463 million people, and could reach up to 700 million in 2045. According to the International Diabetes Federation (IDF), three in every four (79%) people with diabetes live in developing countries, and 63% of the total are of economically active age (up to 60 years old)[1].

Brazil is the fifth country in the world in number of adults with diabetes[1]. Data from the Risk and Protection Factors Surveillance System for Chronic Diseases by Telephone Survey (*Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico* – Vigitel) in 2018 show that the prevalence of self-reported diabetes in the population over 18 years of age was 7.7%, showing an increase in relation to 2011, which was 5.6%[2].

Diabetes can cause many health complications, with high morbidity and mortality, increasing costs for individuals and health systems due to amputations, early retirements, loss of work functions in the productive age group, absenteeism from work and hospital medical costs, as well as the risks of premature death (from 30 to 69 years of age)[3-6], in addition to being among the main causes of death in adults worldwide, before diseases such as acquired immunodeficiency syndrome (AIDS), tuberculosis, and malaria[5].

Among complications, 35% of people with diabetes develop some degree of diabetic retinopathy, 44% of chronic kidney disease, and peripheral neuropathy ranges from 16 to 66% in these individuals, with amputation 20 times more common among people with diabetes than in the overall population[5].

The control of glycemic levels is essential for the treatment of diabetes mellitus. With it, patients remain asymptomatic and prevent acute and chronic complications, promoting quality of life and reducing mortality[3,4,7]. In most people with diabetes, this control can be achieved with the use of medications, in addition to changes in lifestyle, such as the adoption of a balanced diet and the practice of regular physical activity[3,7]. Therefore, expanding access to medicines, as part of comprehensive care for people with diabetes, is an important therapeutic strategy[8].

According to the Family Budget Survey (*Pesquisa de Orçamentos Familiares* – POF), spending on medicines represented 37% of family health expenditures in the 1990s and 42.9% in 2009, with a major impact on family expenses[9]. In order to expand free access to medicines in Brazil, it was observed, especially, until 2016, an increase in the contribution of public resources in this area, especially federal ones[10].

Data from the Institute of Applied Economic Research (*Instituto de Pesquisa Econômica Aplicada* – IPEA) showed that the Ministry of Health's spending on basic, strategic, and specialized components of pharmaceutical assistance increased from R$ 9.7 to 12.8 billion from 2010 to 2016. In the same period, the spending on the *Programa Farmácia Popular do Brasil* – PFPB) increased by 580%, which corresponded to more than 6 billion reais in 2016. Total spending on medicines by the Ministry and by the state and municipal health departments, including the PFPB, passed from 14.4 billion in 2010 to 20 billion in 2015[9], which was also measured in population-based surveys, such as the 2014 National Survey on Access, Use and Promotion of Rational Use of Medicines in Brazil (*Pesquisa Nacional sobre o Acesso, Utilização e Promoção do Uso Racional de Medicamentos no Brasil* – PNAUM): 98% of diabetics obtained full access to their medications, of these, 70.7% obtained it free of charge[11].

Considering the complexity of diabetes, its impact on morbidity and mortality, the magnitude of expenditures related to this disease, both by individuals and by the government, as well as the efforts of federated entities, expanding spending on medications, it is important to provide information to verify the effectiveness of such actions and the free access to medicines by the Brazilian population.

In this study, the prevalence of use of oral medication for the treatment of diabetes was estimated, as well as the distribution of obtaining sources according to sociodemographic variables, in the capitals of the Brazilian states and in the Federal District and its evolution in the period from 2012 to 2018. Thus, this research is justified, since this information is unknown and necessary for the evaluation of public policies on pharmaceutical assistance for the treatment of this disease in Brazil.

METHODS

This is a cross-sectional population-based study that used data from Vigitel, implemented in 2006 by the Ministry of Health aiming to monitor the frequency and distribution of the main determinants of chronic non-communicable diseases (NCD) in the capitals of the 26 Brazilian states and in the Federal District[2].

Survey data from the years 2012 (n = 3,828), 2013 (n = 45,790), 2015 (n = 5,421), 2016 (n = 6,583), 2017 (n = 5,935), and 2018 (n = 5,895) were used. In 2014, questions related to diabetes treatment drugs were not included in the Vigitel system.

Sampling procedures employed by Vigitel aim to obtain, in each of the capitals of the 26 Brazilian states and the Federal District, probabilistic samples of the population of adults (≥ 18 years of age) residing in households that have at least one landline[2].

The first step of the Vigitel sampling consists of systematic and stratified drawing by zip code of about five thousand telephone lines per city; then, these lines are divided into replicas of 200 lines, each replica reproducing the same proportion of lines per zip code of the original record[2].

In the second stage of sampling, one of the adults (≥ 18 years of age) living in the household drawn in the previous stage is drawn from the household. This step is performed after the identification, among the drawn lines, of those eligible for the system, that is, effectively residential and active lines[2]. Post-stratification weights were applied in order to match the sample composition to the population composition of each city, in the same period[2].

In this study, data obtained from questions in the referred morbidity module were used, specifically on the use and sources of diabetes medications, in addition to questions related to the sociodemographic characteristics of individuals, with a cut-out for the population aged 20 years old or older.

The diagnosis of diabetes mellitus was determined by the question: "Has a DOCTOR ever told you that you have diabetes?", and the use of medications by the question: "Are you currently taking any pills to control diabetes?".

Obtaining sources were analyzed by the question "How do you get your diabetes medication?" and categorized into: the Unified Health System (*Sistema Único de Saúde* – SUS) health units — which represent public pharmacies, primarily those in basic units, whose funding is tripartite (federal, state, and municipal) —, PFPB — linked to private establishments with shared participation of paid acquisitions and free of charge drugs for the treatment of diabetes, hypertension and asthma, throughout the Brazilian territory — and other sources (OS; private pharmacy / drugstores) — upon full payment with self-financing.

The survey also includes questions about the use of insulin for the treatment of diabetes, however, in this study, only individuals taking oral medication were involved.

The sociodemographic variables considered were: region of residence (Midwest, Northeast, North, Southeast, South), gender (male, female), age (20 to 39 years, 40 to 59 years, 60 years or more), race / color (white, black / brown / other), education (0 to 4 years

of study, 5 to 8 years of study, 9 to 11 years of study, 12 years or more of study) and having private health insurance (yes, no).

The data were analyzed using the Stata program, version 14®, using the set of *svy* commands, appropriate for the analysis of complex samples, ensuring the necessary sample weighting. The prevalence of use of oral medication for the treatment of diabetes mellitus and the distribution of different sources of medication were estimated, according to sociodemographic variables, with respective 95% confidence intervals (95% CI). Pearson's χ^2 test (Rao-Scott) was applied to assess the differences between proportions, and adherence to the normal distribution of point estimates of drug use in the years considered was verified by the Shapiro-Wilk test. All analyses were performed with a 5% significance level.

Informed consent was obtained orally at the time of telephone contact with the interviewees. The Vigitel project was approved by the National Commission for Ethics in Research for Human Beings of the Ministry of Health (Conep 355.590, of June 26th, 2013). The project in which the present study was carried out was exempted from the Research Ethics Committee of *Universidade Estadual de Campinas* (Unicamp) (CEP/PRP/No. 149/2019).

RESULTS

The prevalence of use of oral medication to treat diabetes in Brazil increased from 77.4% in 2012 to 85.2% in 2018. Among the regions, there was an increase in the South Region, growing from 73.4 to 84.9 % from 2012 to 2018, respectively (Table 1).

As for sociodemographic characteristics, there was an increase in the use of these drugs among men (74.7% in 2012; 87.0% in 2018); in individuals aged 20 to 39 years (33.8% in 2012; 60.7% in 2018); among people who reported black/brown/other skin color (74.0% in 2012; 85.3% in 2018). In relation to education, the increase occurred in the intermediate ranges, from 5 to 8 years of study (77.5% in 2012; 89.5% in 2018) and from 9 to 11 years of study (71.3% in 2012; 83.3% in 2018). There was also an increase in the prevalence of use among people who do not have health insurance, from 74.7 to 84.6% during the study period (Table 1).

With regard to the obtaining sources, there were changes in the period, with a decrease in obtaining oral medication for the treatment of diabetes in pharmacies in SUS health units and an increase in popular pharmacies. The prevalence of obtaining drugs from other sources (private pharmacies) showed stability in the period (Figure 1). Differences in the distributions between the strata for the variables education and private health insurance were evidenced throughout the period observed, with obtaining in pharmacies from SUS units higher in the strata with less education, whereas individuals with higher education and those who reported having health insurance had a higher prevalence of obtaining them in popular and private pharmacies (Table 2).

Obtaining oral antidiabetics in SUS went from 48.7% in 2012 to 40.6% in 2018. This decrease occurred in the Midwest (45.9% in 2012; 33.5% in 2018), the Northeast (40.8%

Table 1. Prevalence of using oral medication to treat diabetes mellitus from 2012 to 2018* in adults (≥20 years old), by sociodemographic characteristics. Vigitel, Brazil.

	2012 % (95%CI)		2013 % (95%CI)		2015 % (95%CI)		2016 % (95%CI)		2017 % (95%CI)		2018 % (95%CI)	
Region	p = 0.186		p = 0.886		p = 0.018		p = 0.017		p = 0.263		p = 0.281	
Midwest	75.2	(69.9 – 79.7)	77.1	(71.7 – 81.8)	82.7	(75.9 – 87.9)	66.2	(59.5 – 72.4)	81.4	(74.3 – 86.9)	81.4	(76.4 – 85.6)
Northeast	79.1	(75.4 – 82.4)	79.1	(75.7 – 82.1)	83.4	(80.5 – 86.0)	78.0	(75.1 – 80.6)	82.3	(79.0 – 85.2)	85.0	(81.7 – 87.9)
North	70.7	(64.8 – 76.0)	80.6	(75.3 – 84.9)	75.6	(69.9 – 80.5)	72.5	(66.9 – 77.5)	76.4	(70.5 – 81.5)	81.2	(73.4 – 87.1)
Southeast	78.6	(73.1 – 83.2)	79.7	(74.4 – 84.1)	86.0	(81.4 – 89.6)	76.4	(71.7 – 80.6)	83.4	(78.6 – 87.2)	86.8	(82.4 – 90.2)
South	73.4	(67.8 – 78.4)	78.1	(71.6 – 83.5)	77.2	(71.2 – 82.3)	75.5	(70.4 – 80.0)	86.1	(81.0 – 90.0)	84.9	(79.7 – 88.9)
Gender	p = 0.146		p = 0.476		p = 0.001		p = 0.222		p = 0.569		p = 0.160	
Male	74.7	(69.0 – 79.7)	78.1	(72.9 – 82.6)	87.6	(84.6 – 90.1)	77.3	(73.0 – 81.1)	81.7	(77.3 – 85.4)	87.0	(83.4 – 89.9)
Female	79.2	(75.9 – 82.1)	80.2	(76.9 – 83.1)	80.3	(76.7 – 83.5)	74.0	(70.7 – 77.1)	83.1	(80.0 – 85.9)	83.8	(80.6 – 86.6)
Age range (Years)	p < 0.001		p < 0.001		p < 0.001		p < 0.001		p < 0.001		p < .001	
20–39	33.8	(24.2 – 45.0)	41.6	(31.0 – 52.9)	57.5	(46.1 – 68.2)	30.1	(21.8 – 40.0)	54.0	(43.2 – 67.3)	60.7	(48.6 – 71.7)
40–59	76.7	(72.2 – 80.6)	77.0	(71.7 – 81.5)	83.6	(79.9 – 86.8)	73.1	(68.7 – 77.0)	82.2	(77.2 – 86.2)	84.2	(80.0 – 87.6)
60 or more	87.7	(84.6 – 90.2)	88.5	(86.2 – 90.5)	88.8	(85.8 – 91.2)	86.8	(84.7 – 88.6)	88.4	(86.1 – 90.4)	91.6	(89.8 – 93.1)
Color/Race	p = 0.072		p = 0.152		p = 0.065		p = 0.055		p = 0.463		p = 0.880	
White	79.6	(75.5 – 83.3)	81.5	(77.6 – 84.9)	85.9	(82.3 – 88.9)	77.2	(73.5 – 80.5)	83.4	(79.7 – 86.6)	84.9	(81.0 – 88.2)
Black/Brown/other	74.0	(68.9 – 78.5)	77.3	(72.4 – 81.5)	81.4	(77.8 – 84.5)	71.9	(67.5 – 75.9)	81.6	(78.0 – 84.7)	85.3	(82.2 – 87.9)
Education (years)	p = 0.003		p = 0.063		p = 0.468		p =< 0.001		p = 0.066		p =< 0.001	
0 to 4	84.3	(79.7 – 88.0)	83.4	(77.9 – 87.7)	83.2	(78.1 – 87.4)	83.3	(78.8 – 87.1)	86.9	(83.2 – 89.9)	88.3	(84.6 – 91.2)
5 to 8	77.5	(70.4 – 83.3)	79.5	(74.0 – 84.1)	85.2	(80.2 – 89.1)	79.2	(73.7 – 83.7)	80.1	(73.0 – 85.7)	89.5	(85.6 – 92.5)
9 to 11	71.3	(65.9 – 76.1)	75.2	(69.3 – 80.2)	83.9	(80.5 – 86.8)	67.5	(62.5 – 72.3)	81.3	(76.9 – 85.1)	83.3	(78.3 – 87.4)
12 or more	71.1	(62.0 – 78.8)	73.9	(66.7 – 80.0)	79.5	(73.0 – 84.7)	63.8	(57.1 – 69.9)	78.5	(72.4 – 83.7)	73.7	(65.7 – 80.3)
Health insurance	p = 0.029		p = 0.462		p = 0.381		p = 0.241		p = 0.207		p = 0.544	
Yes	80.8	(77.0 – 84.1)	80.3	(76.5 – 83.6)	84.6	(81.0 – 87.7)	76.9	(73.5 – 80.0)	84.2	(80.7 – 87.2)	86.0	(82.5 – 88.8)
No	74.7	(70.1 – 78.7)	78.3	(74.0 – 82.1)	82.6	(79.1 – 85.6)	73.9	(70.0 – 77.5)	81.1	(77.4 – 84.4)	84.6	(81.3 – 87.4)
Total	77.4	(74.3 – 80.1)	79.3	(76.4 – 81.9)	83.4	(81.0 – 85.6)	75.3	(72.7 – 77.8)	82.5	(80.0 – 84.8)	85.2	(82.8 – 87.2)

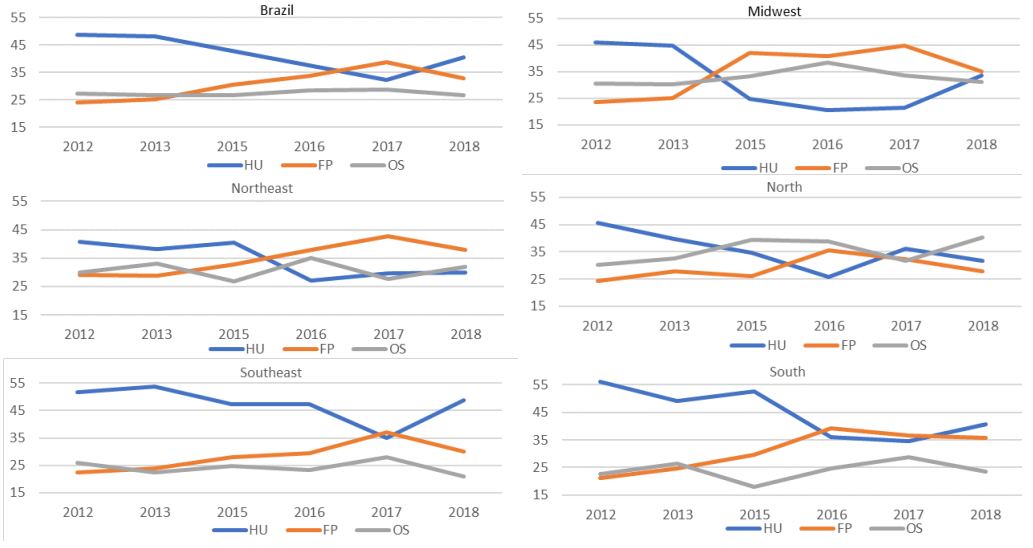
*In 2014, no data were collected; Vigitel: Risk and Protection Factors Surveillance System for Chronic Diseases by Telephone Survey (*Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico*); 95% CI: 95% confidence interval.

in 2012; 30.0% in 2018), and the South (56.1% in 2012; 40.8% in 2018), and remained stable in other regions. Obtaining drugs in SUS decreased among women, adults between 20 and 59 years old, people of black/brown/other color and among those who had no health insurance. In PFPB units, the acquisition of oral antidiabetic drugs grew, starting from 24.0% in 2012 and reaching 32.8% in 2018. This increase occurred in the Midwest (23.5% in 2012; 35.2% in 2018), Northeast (29.2% in 2012; 38.0% in 2018), and South (24.2% in 2012; 35.8% in 2018) regions. An increase was also observed among women, adults aged 20-59 years, white people, individuals with 5 to 8 years of study and among those without health insurance. Obtaining diabetes medications from other sources increased in individuals with 12 years or more of study, however, this increase was occasional and not observed in the general population, in which obtaining drugs from this source showed stability in the period (Table 2).

Despite the fall, SUS remained the main source for obtaining oral antidiabetics in Brazil, in front of the PFPB and other sources, respectively.

DISCUSSION

The study highlights the increase in the use of oral medication to treat diabetes from 77.4% in 2012 to 85.2% in 2018; similar to those results found by Vigitel in 2011 and by



HU: health unit of the Unified Health System (*Sistema Único de Saúde* – SUS); OS: other sources (private/private pharmacies); FP: popular pharmacy (*farmácia popular*) program in Brazil; Vigitel: Risk and Protection Factors Surveillance System for Chronic Diseases by Telephone Survey (*Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico*).

Figure 1. Percentage distribution of obtaining sources for oral medication for the treatment of diabetes mellitus in adults (≥ 20 years) in Brazil and by region. Vigitel, Brazil, 2012 to 2018.

Table 2. Percentage distribution of obtaining sources for oral medication for the treatment of diabetes mellitus in adults (≥20 years old) according to sociodemographic characteristics. Vigitel, Brazil, 2012 to 2018*.

	2012 %			2013 %			2015 %			2016 %			2017 %			2018 %		
	HU	FP	OS	HU	FP	OS	HU	FP	OS	HU	FP	OS	HU	FP	OS	HU	FP	OS
Region	p = 0.041			p < 0.001			p < 0.001			p < 0.001			p < 0.001			p < 0.001		
Midwest	45.9	23.5	30.6	44.8	25.0	30.2	24.8	42.0	33.2	20,6	40,9	38,5	21,5	44,8	33,7	33,5	35,2	31,3
Northeast	40.8	29.2	30.0	38.3	28.7	33.0	40.6	32.7	26.7	27,0	37,9	35,1	29,8	42,6	27,6	30,0	38,0	32,0
North	45.5	24.3	30.2	39.7	27.8	32.5	34.6	25.9	39.5	25,8	35,4	38,8	36,2	32,2	31,6	31,8	27,9	40,3
Southeast	51.7	22.3	26.0	53.8	23.8	22.4	47.4	27.9	24.7	47,3	29,5	23,2	34,9	37,1	28,0	48,8	30,1	21,0
South	56.1	21.2	22.7	49.1	24.7	26.3	52.6	29.5	17.9	36,1	39,2	24,7	34,6	36,5	28,9	40,8	35,8	23,4
Gender	p = 0.059			p = 0.062			p = 0.013			p = 0.005			p = 0.002			p = 0.021		
Male	43.2	26.0	30.8	45.9	23.4	30.7	44.2	25.3	30.5	36,6	29,5	33,9	31,7	33,6	34,7	40,8	29,1	30,2
Female	52.2	22.7	25.1	49.6	26.9	23.5	41.7	34.7	23.6	38,3	36,8	24,9	32,9	42,5	24,6	40,6	35,7	23,8
Age range (years)	p = 0.276			p = 0.214			p = 0.229			p = 0.045			p = 0.465			p = 0.961		
20–39	48.6	25.8	25.6	35.2	30.0	34.8	42.9	38.2	18.9	20,3	43,2	36,8	37,7	24,1	38,2	42,0	34,6	23,5
40–59	53.3	20.8	25.9	47.7	28.3	24.0	39.9	33.9	26.2	41,2	35,0	23,8	32,5	40,6	26,9	40,2	32,3	27,5
60 or more	45.1	26.3	28.6	49.4	22.9	27.7	45.0	26.8	28.2	36,4	32,2	31,3	31,7	39,0	29,3	40,7	32,9	26,4
Color/Race	p = 0.008			p = 0.764			p = 0.013			p = 0.004			p = 0.094			p = 0.013		
White	43.3	24.5	32.2	46.4	25.7	27.9	37.6	30.8	31.6	30,9	36,5	32,6	28,6	42,4	28,9	35,6	34,9	29,5
Black/brown/other	53.6	24.1	22.3	49.0	24.9	26.1	47.0	30.1	22.9	41,9	32,2	25,9	34,2	36,5	29,3	44,2	31,4	24,4
Education (years)	p < 0.001			p < 0.001			p < 0.001			p < 0.001			p < 0.001			p < 0.001		
0 to 4	55.5	22.1	22.4	60.0	20.5	19.5	54.6	29.6	15.8	47.2	29.7	23.1	42.4	37.4	20.2	47.5	30.6	21.9
5 to 8	58.5	17.8	23.7	49.7	24.6	25.7	49.5	25.9	24.6	46.4	31.6	22.0	36.3	37.5	26.2	49.9	30.8	19.3
9 to 11	39.9	31.0	29.1	39.1	31.7	29.1	33.5	35.9	30.6	25.8	39.2	35.0	25.6	41.6	32.8	35.5	36.8	27.7
12 or more	22.9	29.4	47.7	20.4	31.6	48.0	13.1	34.0	52.9	11.9	41.1	47.0	11.3	39.1	49.6	12.7	35.6	51.8
Health insurance	p < 0.001			p < 0.001			p < 0.001			p < 0.001			p < 0.001			p < 0.001		
Yes	27.3	32.3	40.4	25.7	32.9	41.4	22.7	37.8	39.5	17.9	40.0	42.1	13.3	46.2	40.5	21.3	36.5	42.1
No	66.4	17.1	16.5	66.9	19.1	14.0	59.4	24.5	16.1	54.9	28.2	16.9	47.0	33.4	19.6	53.7	30.2	16.0
Total	48.7	24.0	27.3	48.0	25.4	26.6	42.8	30.5	26.7	37.6	33.8	28.6	32.4	38.7	28.9	40.6	32.8	26.6

*In 2014, no data were collected; HU: health unit of the Unified Health System (*Sistema Único de Saúde* – SUS); OS: other sources (private/private pharmacies); FP: popular pharmacy program (*Programa Farmácia Popular*) in Brazil; Vigitel: Risk and Protection Factors Surveillance System for Chronic Diseases by Telephone Survey (*Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico*).

the National Health Survey (*Pesquisa Nacional de Saúde* – PNS) of 2013 whose prevalence was 78.2 and 80.2%, respectively, including oral medication and insulin[8,12,13].

As in the PNS of 2013, this study showed no differences between the macro-regions, with the exception of 2016, when the Midwest Region had lower prevalence than the Northeast. PNAUM data showed great variability in the global prevalence of drug use by Brazilian regions, with less global use of drugs in the North Region and lower prevalence of use of drugs for the treatment of chronic diseases in the North, Northeast, and Midwest[14].

This information indicates that there was a decrease in regional inequalities in access to medicines for diabetes, but these differences remain for other kinds of drugs[8,14]. One factor that may contribute to this result is the possibility of obtaining free oral antidiabetic drugs also from the PFPB, which is not the case with the vast majority of medicines in the Basic Component of Pharmaceutical Care, which can be obtained for free only at SUS health units.

There was an increase in the use of these drugs among men, but without significant differences between genders, in agreement with the 2013 PNS, but differently from PNAUM, in which the use was greater in women. This latest study evaluated the use of drugs to treat chronic diseases in general, and not just diabetes[8,14].

There was an increase in the prevalence of use of oral antidiabetics in the age group of 20 to 39 years, however the prevalences found in this study were lower than those observed in the PNS for the same age group (60.0%)[8]. The use of medicines by age group is consistent with the population's morbidity profile, in which the prevalence increases with age, which is already established in the literature.

The lower use among younger people can be attributed to a lower indication of drug treatment in this group and a greater incentive to non-drug therapies, such as healthy eating, physical activity, reduction of alcohol consumption, and non-consumption of tobacco[8,14]. Drug treatments may also vary depending on the type of diabetes. People with type 1 diabetes mellitus (DM1) require daily injections of insulin to maintain appropriate glucose levels[1]. According to data from the World Health Organization (WHO), the global prevalence of DM1 varies from 5 to 10% of the total[15]. In Brazil, it is estimated that there are more than one million people living with DM1, and this condition can develop at any age, although it is more common in children and young people[15,16]. A previous study using data from Vigitel 2011, covering oral medications and insulin, found similar results in the same age groups[13], confirming that, regardless of the route of administration of the medication (oral or injectable, in the case of insulin), the use of antidiabetic drugs in young adult population is lower than in the population aged 40 years old or older.

There was also an increase in use by those self-reported black/brown/other color, with schooling up to 11 years of study and among people who do not have health insurance, indicating a possible decrease in inequality in the use of drugs to treat the disease in these groups. There was no difference in the use of medications between having and not having health insurance or between levels of education, suggesting, therefore, that

access to oral medications for the treatment of diabetes in this period was equitable in the country, highlighting the importance of public pharmaceutical assistance as a factor in reducing health inequities in Brazil.

The study also points out that populations with low schooling, without health insurance and of black/brown/other color were the largest users of medicines from SUS and PFPB, which was also identified in the PNS 2013[8,12,17,18] and in other studies[10,13,19-21]. PNAUM, also carried out in 2013, indicated that 61% of diabetes medications were obtained from the SUS network and 18% from the Popular Pharmacy Program (*Programa Farmácia Popular* – FP)[22]. These findings reiterate the role of SUS and primary care in equity of care.

There was an increase in the obtaining of medicines in popular pharmacies and a decrease in obtaining them in pharmacies at SUS health units, the latter being greater in the strata with less education, among those who reported being black/brown/other skin color, whereas individuals with higher education and who reported having health insurance had a higher prevalence of obtaining them in popular and private pharmacies. These results corroborate those found in 2011 by Vigitel[13].

Another national study that addressed inequalities in access to medicines showed that obtaining drugs from commercial pharmacies increased along with socioeconomic status, while from SUS, it decreased[23]. Possible difficulties in obtaining drugs in SUS pharmacies, such as finding all the drugs prescribed in the same unit, can also contribute to this scenario.

Secondary data from the National Program for Improving Access and Quality in Primary Care (2014) identified that only 30.2% of basic health units (*unidades básicas de saúde* – UBS) had total availability of standardized antidiabetics[24]. This situation can motivate the strata of better socioeconomic conditions to seek for other sources, either through the PFPB or even paying for the drug treatment in private pharmacies.

PNAUM, when evaluating the use of medications by people with chronic diseases who used SUS, also showed a higher prevalence of obtaining drugs in SUS by those who do not have health insurance; however there were no differences in acquisitions according to skin color/race and education[20].

SUS units remained the main source of oral antidiabetics in Brazil and, considering that SUS funding also covers the drugs from FP, adding both sources, the present study points out that SUS finances over 70% of oral diabetes medicines in the country, showing their strategic importance in supporting the health of the Brazilian population[13,17,18,20].

In addition to oral medications, SUS offers free medications in the basic health network, including other medications for the treatment of diabetes, such as insulins and also the necessary monitoring supplies (blood glucose and glycosuria tapes). In a complementary way, FP in Brazil started to offer, as of 2011, free medicines for hypertension, diabetes, and asthma in order to expand access and treatment to this group of individuals[25,26].

In the national scenario, for the period considered, the important austerity crisis in the country stands out, with approval of Constitutional Amendment No. 95 and reduction of investment in health and social policies in 2016[27-29]. The study points out that, as of 2015, there was a reduction in access to medicines in SUS pharmacies, with replacement

by private pharmacies accredited in FP. This fall was accentuated in the 2016 and, especially, 2017, a possible reflection of the austerity policies and the reduction of resources of the municipalities due to the fall in the federal budget assignment[27].

Among the limitations of the study, it should be considered that the information was referred to; it is possible that the prevalence of diabetes is underestimated by the absence of prior medical diagnosis and, consequently, by the underestimation of the prevalence of medication used by these people. In addition, the use of landlines to draw the sample should be considered, however the use of post-stratification weights can reduce this bias. In addition, the study analyzed only the oral use of medications, not including insulin, which could increase the observed frequencies even further.

It is important to highlight as a strong point of this study the representativeness of the data presented regarding the capitals of all Brazilian states and the Federal District. It is also emphasized that the temporal evaluation carried out allowed for the monitoring of information in the period by means of random samples in repeated surveys. Vigitel is the only national survey carried out on an annual basis. Information on oral antidiabetics was included in the research from 2012, and the present study outlined, for the first time, the panorama of use of these drugs, providing the opportunity for regular and continuous monitoring of the evolution of the use of oral drugs for the treatment of diabetes by the adult Brazilian population and its obtaining sources.

SUS remained the main source for obtaining oral antidiabetics in Brazil, financing more than 70% of oral diabetes medicines in the country, considering the pharmacies of health units and popular pharmacies, showing the importance of public pharmaceutical policies in the access to medicines by the Brazilian population and the reduction of inequities in the country. However, the migration of users from SUS health units to popular pharmacies suggests weakening the responsibility of primary health care in offering oral antidiabetic drugs, weakening the bond and longitudinal care that contribute to more accurate diagnoses and treatments, decrease care costs, and greater patient satisfaction[30-32] in primary health care.

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