

## Prevalence and associated factors with homeopathy use in Brazil: a population-based study

Prevalência e fatores associados ao uso de homeopatia no Brasil: estudo de base populacional

Prevalencia y factores asociados a la práctica de la homeopatía en Brasil: un estudio de base poblacional

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### Abstract

*Despite the controversy about its efficacy, homeopathy is considered a medical practice alternative to the conventional medical model. Prevalence of homeopathy use varies greatly among countries and the literature has conflicting evidence about the relation between sociodemographic factors and health conditions associated with homeopathy use. We aim to estimate the prevalence of homeopathy use and its association with self-perceived health status, depression, and sociodemographic factors. We used data from 90,846 participants in the 2019 Brazilian National Survey of Health (PNS 2019), a population-based study with complex and probabilistic sampling. Sociodemographic and clinical data and information on homeopathy use during the last 12 months were collected. The Patient Health Questionnaire-9 (PHQ-9) was used to assess depression. All variables were categorized. Logistic regression models were built to obtain crude and adjusted odds ratios (OR) and 95% confidence intervals (95%CI). The prevalence of homeopathy use was 0.99% (95%CI: 0.98-1.00). In the adjusted analysis, the following variables were associated with higher use of homeopathy: female gender, age above 51 years, white ethnicity, higher socioeconomic and educational attainment, residence in Southern/Southeastern Brazil, poorer self-reported health status, and depression. Brazil shows increased offer of complementary medicine, including homeopathy. Nevertheless, the use of homeopathy treatment is very low and clearly associated with a higher socioeconomic status, poorer self-reported health status, and depression.*

*Homeopathy; Depression; Complementary Therapies; Traditional Medicine; Unified Health System*

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## Introduction

The term “complementary medicine” refers to a broad set of health care practices, which are outside the traditional or conventional medicine in a given country, and only partially integrated into its dominant healthcare system. Traditional and complementary medicine merges the terms “complementary medicine” and “traditional medicine”, encompassing products, practices, and practitioners, and is used interchangeably with traditional medicine in some countries <sup>1</sup>.

In Brazil, Tesser & Luz <sup>2</sup> developed the analytical category called “medical rationalities” to investigate and compare complex medical systems. A care/healing system is considered a “medical rationality” if such system enables the identification and description of six constituent, coherent, and mutually articulated dimensions can be identified and described in this system, i.e., a medical doctrine (general conceptions and explanations about life, health, illness, and healing), a vital dynamics (equivalent to physiology, in biomedicine), a morphology (or anatomy, in bioscience), a diagnostic system, and a therapeutic system. A worldview or cosmology permeates these five dimensions, which is the its sixth underlying dimension. Through this categorization, it is possible to research and recognize biomedicine, homeopathy, traditional Chinese medicine, anthroposophic medicine, and Ayurvedic medicine as a medical rationality <sup>2</sup>.

Since 2018, 170 World Health Organization’s (WHO) member States acknowledged their use of traditional complementary integrative medicine (TCIM), and 97 of these countries had a national policy <sup>1</sup>. In Brazil, TCIM is known as integrative and complementary practices. The Brazilian Unified National Health System (SUS) regulated and implemented these practices in 2006 <sup>3</sup>. The SUS is a free and universal public health system which offers low and high-complexity medical assistance in all regions of the country, covering the demands for medical and hospital care of 70% of the Brazilian population <sup>4</sup>.

TCIM includes several practices with greatly varying prevalence use between countries. The most common form of TCIM practices are acupuncture, herbal medicines, traditional Chinese medicine, and homeopathy. Nevertheless, regulation of TCIM providers is much less common among WHO member States. For example, only 22 member States regulate homeopathy providers <sup>1</sup>. Moreover, we find great controversy about the effectiveness of homeopathic treatment. On one hand, homeopathy is considered a complementary practice to the conventional disease-focused and technology-based medical model. On the other hand, a recent review reported that the clinical effects of homeopathy derive from the placebo effect, even though it may be used to treat certain medical conditions <sup>5</sup>. This “scientific discussion” has failed to stop people in different countries from opting for this complementary medical practice. On the contrary, homeopathy seems to be popular in countries such as India, France, and the United Kingdom. As a matter of fact, the debate about their effectiveness has failed to precluded several countries from including homeopathy in their publicly funded healthcare systems, of which the United Kingdom, France, Italy, Germany, Switzerland, India, Pakistan, Brazil, and Mexico are the most important examples <sup>6</sup>.

The literature has few population-based studies assessing the prevalence of homeopathy use and its associated factors. Overall, homeopathy use varies greatly between countries, with the highest prevalence seen in Switzerland (8.2%), which covers homeopathy in its compulsory health insurance <sup>7</sup>. United States, United Kingdom, Australia, and Canada show lower rates, ranging from 0.2% to 2.9% <sup>8</sup>. In Brazil, two studies used the *National Survey of Health* (PNS 2013) and found a 0.6% prevalence of homeopathy use in the previous 12 months among Brazilian adults <sup>9,10</sup>. Boccolini & Boccolini <sup>10</sup> also evaluated the relation between different types of TCIM therapy (including homeopathy) and respondents’ sociodemographic characteristics, finding a great heterogeneity regarding the types of TCIM practices participants used, by participants with different characteristics and from different socioeconomic strata across Brazilian regions. According to their socioeconomic status, subjects from upper classes living in Southern Brazil had higher chances to use acupuncture and homeopathy, than individuals from other socioeconomic classes and less developed regions of the country <sup>10</sup>.

Another aspect is the association between poorer self-perceived health and poorer psychological health, which are closely related to any type of TCIM use, including homeopathy treatment. Research has found mixed data about this relation when it considered different TCIM types together. A narrative review <sup>11</sup> found no strong evidence for the stereotypical belief that those who seek TCIM

treatments have higher psychological morbidity. In contrast, a cross-sectional population-based survey from 32 countries found that poor or fair health status, unhappiness and depression were associated with TCIM use<sup>12</sup>. If evaluated by itself, a similar controversy about the relation between mental health status and homeopathy treatment arises. A study conducted in the United States found no significant difference in the prevalence of homeopathy use among older adults with and without self-reported anxiety or depression<sup>13</sup>. On the other hand, a French study assessed which patient characteristics are associated with a lifetime use of homeopathic treatment for psychiatric symptoms among a sample of 36,785 persons, finding that homeopathy users were 2.5 times more likely to show mood disorders and nearly three times more likely to suffer from anxiety disorders than persons who did not take psychotropic drugs<sup>14</sup>.

This study aims to estimate the prevalence of homeopathy use among a population-based sample of Brazilian adults. Additionally, we aim to assess the association of self-perceived health status, depression, and sociodemographic risk factors with homeopathy use.

## Material and methods

### Design and sample

Data from the PNS 2019, carried out from August 2019 to March 2020, were used. PNS uses a multi-stage clustered sample. Its first stage consisted of a simple random selection of census tracts from the *2010 Demographic Census* (its primary sample units), of which small and special tracts, such as barracks and long-term institutions, were excluded. The second and third stages of the survey performed a simple random selection of (a) households (secondary sample units) and (b) persons aged 15 years or above who lived in those houses (tertiary sample units). The expected sample size (108,255 households), considering a 20% of non-response rate, guarantees an 80% statistical power and precise health indicator estimates. Data were collected via interviews conducted by trained interviewers by a questionnaire inserted in a mobile data collection device. Further details on PNS 2019 have been published<sup>15</sup>. PNS 2019 aimed to provide Brazil with information on the Brazilian population's health determinants and needs<sup>15</sup>. The questionnaire had three parts, covering (i) household characteristics; (ii) data about on all residents, especially on socioeconomic and health factors; and (iii) information about the selected resident (aged 15 years or above), focusing especially on lifestyle, chronic diseases, violence, among other topics. For our analyses, participants aged between 15 and 107 years, who answered the *Selected Resident Questionnaire* of PNS, were selected. Thus, data from a sample of 90,846 persons, interviewed in the PNS 2019, were assessed.

### Main outcome variable

The following questions from PNS 2019 were used to assess our main outcome. The first question was "Over the past 12 months, did you treat yourself with an integrative and complementary practice, such as acupuncture, homeopathy, medicinal plants, and phytotherapy, among others?". Possible answers were "yes" or "no". Participants who gave a positive answer were also asked "What type of treatment did you use?". Only participants who answered "homeopathy" were analyzed in this study.

### Covariates

On the basis of the PNS 2019 questionnaire data, the following sociodemographic factors were assessed: gender (male or female); age (15/34; 35/53; 54/105 years old); self-reported skin color (other or white); living with a partner (yes or no); living area (rural or urban); years of schooling (up to 8; 9 to 11; 12 or more); region of residence (North/Northeast/Central-West or South/Southeast); private health insurance (no or yes); and household monthly income per person, according to the Brazilian minimum wage in quartiles (1 minimum wage = USD 242.20) (0 to  $\leq$  1/2; > 1/2 to  $\leq$  1; > 1 to  $\leq$  2; > 2). The household monthly income per person was estimated by dividing family income by the number of persons living in the household. Information about the self-perceived health status was also

collected and classified as: very good/good; regular or poor/very poor. Data on payments for homeopathy treatment were also collected. In total, two questions: “Did you pay anything for this treatment?”; and “Was this treatment provided by the Unified Health System (SUS)?”, were used to evaluate the source of funding for the homeopathic treatment. Possible answers for these questions were: no; yes and no; yes, partially; yes, completely, respectively.

### **Patient Health Questionnaire-9**

The *Patient Health Questionnaire-9* (PHQ-9), a screening tool for depression which enables diagnosis (according to the *Diagnostic and Statistical Manual of Mental Disorders – DSM-IV – criteria for depressive disorder*), was answered by all participants. This instrument assesses the presence and intensity of nine items in the two weeks preceding the interview. Scores range from 0 (“not once”) to 3 (“almost every day”) and total scores can range from 0 to 27. Scores of 10 or more are considered cases of major depression<sup>16</sup>. In total, three categories of depression were used: no depression (score < 10), mild-moderate depression (score 10-14), and moderate-severe depression (score > 14). Cronbach’s alpha was used as our reliability coefficient, totaling 0.84 for PHQ-9 total scores<sup>17</sup>.

### **Statistical analysis**

Descriptive analysis was performed. All variables were categorized. Logistic regression models were built to obtain crude and adjusted odds ratio (OR) and 95% confidence intervals (95%CI) for the association between our explanatory variables and homeopathy use. Covariates were identified a priori based on previous research on homeopathy use. All variables (sociodemographic, self-perceived health status, and depression score) were included in our adjusted multivariate model. Statistical analysis was performed via Stata 16 (<https://www.stata.com>) and its *svy* command. All estimates were weighted to account for the PNS 2019 complex survey design and to make the estimates nationally representative (weighted pooled N = 168,426,190).

### **Ethical considerations**

Ethical approval and participation consent for the PNS 2019 were granted by the Brazilian National Health Ethics Committee (CONEP; process n. 3,529,376). Participation was voluntary and informed consent forms were signed by all participants. The questionnaire could be completely or only partially answered. The PNS dataset is publicly available on the Brazilian Institute of Geography and Statistics (IBGE) website and its information, anonymized.

## **Results**

We found, in the PNS 2019 data set, 90,846 participants with complete information about their use of homeopathy. The data set lacked 32 missing pieces of information about self-reported skin color (10) and family income (22). In the survey, 52.9% of the participants were women, 42.9% were white, 58.3% had a partnered status, and 33.3% were 52 years or older. The average age was 46.2 (SD = 17.5; range 15 to 105). Regarding socioeconomic status, 43.1% attended completed elementary school and more than half (52.3%) had a monthly income per capita of one Brazilian minimum wage or less. Most lived in urban areas (85.9%) and approximately 58% lived in the more developed regions of Brazil (South/Southwest). Nearly one-fourth (26.6%) of participants had private health insurance (Table 1). We found a 0.99% prevalence of homeopathy use in our sample (95%CI: 0.98-1.0). Among participants who were being treated with homeopathic treatment, 78.6% (95%CI: 75.0-81.7) reported paying for it and 94% (95%CI: 91.4-95.8), reported that SUS did not provide it. Only 2.9% (95%CI: 1.8-4.8) of homeopathy users reported that SUS provided them with such treatment.

We found a higher use of homeopathy among white (1.5%), women (1.3%), aged 52 or older (1.1%), with tertiary education (2.9%), highest monthly income per capita (2.8%), who lived in urban areas

**Table 1**Characteristics of participants in the *Brazilian National Health Survey*, 2019.

Characteristics	%	95%CI
Gender		
Male	47.1	46.7-47.4
Female	52.9	52.5-53.2
Age (years)		
15/33	33.8	33.4-34.1
34/51	32.9	32.4-33.3
52/105	33.3	32.9-33.6
Race/Color		
Other	57.1	56.3-57.7
White	42.9	42.2-43.6
Schooling		
Elementary	43.1	42.4-43.7
High school	37.1	36.5-37.6
Tertiary education	19.8	19.1-20.4
Monthly income per capita (minimum wage)		
Up to ½	23.1	22.5-23.6
Up to 1	29.2	28.6-29.8
Up to 2	27.6	26.9-28.1
More than 2	20.1	19.4-20.8
Lives with a partner		
Yes	58.3	57.8-58.8
No	41.7	41.1-42.1
Private health insurance		
No	73.4	72.6-74.2
Yes	26.6	25.7-27.3
Area		
Rural	14.1	13.7-14.4
Urban	85.9	85.5-86.2
Country region		
North/Northeast/Central-West	42.3	41.7-42.8
South/Southeast	57.7	57.1-58.2
Perception of health status		
Very good/Good	68.6	68.0-69.1
Regular/Poor/Very poor	31.4	30.8-31.9
PHQ-9 score		
0-9	89.6	89.1-89.9
10-14	6.5	6.2-6.8
> 14	3.9	3.7-4.2

95%CI: 95% confidence interval; PHQ: *Patient Health Questionnaire*.

(1.3%) in more developed regions (1.3%), with private health insurance (2.2%), and a PHQ-9 score greater than 14 (1.9%) (Table 2).

In our bivariate analysis, the following variables were associated with increased use of homeopathy: female gender (OR = 2.37; 95%CI: 1.81-3.10), age between 34 and 51 years old (OR = 1.45; 95%CI: 1.05-2.00) or 52 years or older (OR = 1.68; 95%CI: 1.20-2.34), white skin color (OR = 3.21; 95%CI: 2.46-4.17), completed secondary (OR = 2.14; 95%CI: 1.47-3.11) or tertiary education (OR = 9.72; 95%CI: 7.12-13.2), having up to one (OR = 1.99; 95%CI: 1.08-3.66), up to two (OR = 3.65; 95%CI: 2.10-6.37) or more than two Brazilian minimum wages (family income per capita) (OR = 13.60; 95%CI:

**Table 2**Participants' characteristics according to their use of homeopathy in the *Brazilian National Health Survey, 2019*.

Variables	%	95% CI	p-value
Gender			< 0.001
Male	0.5	0.4-0.7	
Female	1.3	1.1-1.5	
Age (years)			0.002
15/33	0.7	0.5-0.9	
34/51	1.0	0.8-1.2	
52/105	1.1	0.9-1.4	
Race/Color			< 0.001
Other	0.5	0.4-0.6	
White	1.5	1.3-1.8	
Schooling			< 0.001
Elementary	0.3	0.2-0.4	
High school	0.6	0.5-0.8	
Tertiary education	2.9	2.4-3.4	
Monthly income per capita (minimum wage)			< 0.001
Up to ½	0.2	0.1-0.3	
Up to 1	0.4	0.2-0.6	
Up to 2	0.7	0.5-1.0	
More than 2	2.8	2.3-3.3	
Lives with a partner			0.930
Yes	1.0	0.8-1.3	
No	0.8	0.7-1.0	
Private health insurance			< 0.001
No	0.4	0.3-0.6	
Yes	2.2	1.9-2.5	
Area			< 0.001
Rural	0.4	0.3-0.4	
Urban	1.3	1.1-1.6	
Country region			< 0.001
North/Northeast/Central-West	0.4	0.3-0.4	
South/Southeast	1.3	1.1-1.6	
Perception of health status			0.450
Very good/Good	1.0	0.8-1.1	
Regular/Poor/Very poor	0.8	0.7-1.1	
PHQ-9 score			< 0.001
0-9	0.8	0.7-0.9	
10-14	1.7	1.1-2.6	
> 14	1.9	1.3-3.0	

95%CI: 95% confidence interval; PHQ: *Patient Health Questionnaire*.

8.20-22.60), having private health insurance (OR = 4.50; 95%CI: 3.44-5.90), residence in urban areas (OR = 3.64; 95%CI: 2.48-5.35), in Southern/Southeastern Brazil (OR = 3.45; 95%CI: 2.73-4.35), and scoring between 10 and 14 in the PHQ-9 (OR = 2.05; 95%CI: 1.34-3.13) or a PHQ-9 score above 14 (OR = 2.38; 95%CI: 1.51-3.75) (Table 3). In our adjusted analysis, the following variables were independently associated with higher use of homeopathy: being female gender, age above 51 years, white skin color, having the highest family income per capita (more than two Brazilian minimum wages), completed secondary or tertiary education, residence in Southern/Southeastern Brazil, poorer

self-perceived health status, and a PHQ-9 score between 10 and 14 or above 14 (Table 3). The variable related to having private healthcare was marginally associated with homeopathy use (Table 3).

## Discussion

Our findings showed that homeopathy use is very low (0.99%) in Brazil and it is associated with certain demographic and health status characteristics, such as higher socioeconomic and educational status, being the female gender, self-reporting as being white, being older than 51, living in an urban area, living in Southern/Southeastern Brazil, poorer self-perceived health status, and depression.

Regarding homeopathy use prevalence, studies employed several assessment methods, including over-the-counter (OTC) purchase of homeopathic products and visiting or being received treatment from a homeopath<sup>7,8,18</sup>. Some studies assessed a nationally representative sample<sup>7,19</sup> whereas others used a convenience sample<sup>20</sup>. These differences may explain the large variation of homeopathy use seen among studies. Klein et al.<sup>7</sup> analyzed data from the *Swiss Health Surveys 2007 and 2012* (N = 14,432 and 18,357, respectively) for people aged 15 years or older, finding a 8.2% prevalence of homeopathy use. A Norwegian cross-sectional study evaluated 7,888 families, reporting that the homeopathy use prevalence amounted to 6%<sup>20</sup>. Dossett et al.<sup>19</sup> used the *2012 National Health Interview Survey* (NHIS), finding a 2.1% prevalence of homeopathy use among adults in the United States. The 2002 and 2007 NHIS reported an annual homeopathy use prevalence among adults in the United States of 1.7% and 1.8%, respectively<sup>21</sup>. Thomas & Coleman<sup>22</sup> interviewed a representative sample of adults in England, Scotland, and Wales, finding an annual prevalence of homeopathy use at 1.9%. A study which used the French national health insurance databases (SNIIRAM) to analyze prescriptions of reimbursed homeopathic drugs or preparations in the overall French population from July 2011 to and June 2012 found a higher prevalence (10.2%), which means that a total of 6,705,420 patients received at least one reimbursement for a homeopathic remedy during a 12-month period<sup>23</sup>.

Overall, two studies systematically reviewed data on homeopathy use prevalence in different countries. Cooper et al.<sup>18</sup> assessed 41 surveys across 12 countries of the 12-month prevalence of visits to complementary and alternative medicine practitioners for five therapies, including homeopathy. They found a 1.5% prevalence of visits to a homeopath among adults was 1.5%. Relton et al.<sup>8</sup> summarized prevalence data for both treatments by a homeopath and all homeopathy use, including purchases of OTC homeopathic medicines from 11 countries (United States, United Kingdom, Australia, Israel, Canada, Switzerland, Norway, Germany, South Korea, Japan, and Singapore). They reported a 1.5% 12-month prevalence of homeopathic treatment among adults from 24 surveys (from 0.2% to 8.2%). Rates in the United States, United Kingdom, Australia, and Canada ranged from 0.2% to 2.9%, and remained stable over the years surveyed (1986 to 2012). The 12-month prevalence of all use of homeopathy among adults (purchase of OTC homeopathic medicines and treatment by a homeopath) reported in 10 surveys was 3.9% (from 0.7% to 9.8%). Rates in the United States and Australia ranged from 1.7% to 4.4% and remained stable over the surveyed years. Boing et al.<sup>9</sup> reported a 0.6% prevalence of homeopathy use among Brazilian adults, slightly lower than our findings. Possible explanations for the lower rate of homeopathy users in Brazil are the perception that homeopathy is unable to treat patients with more complicated diseases, the lack of high-quality research assessing the effects of homeopathy, and the lack of information from health managers in the country<sup>24</sup>. A further reason may be the costs of homeopathic products. Even though the SUS provides public homeopathy appointments, it fails to cover the medication costs. Homeopathy products are expensive for a great portion of the population. This is in line with our findings, as less than 5% of the homeopathy users reported not having to pay for treatment.

The literature offers mixed evidence on the sociodemographic and health profile of people who seek TCIM treatments in general. Peltzer & Pengpid<sup>12</sup> used data from 32 countries to show that middle-aged women with lower educational attainment and socioeconomic status were associated with seeking TCIM treatments. In contrast, Guillaud et al.<sup>25</sup> systematically summarize data on the predictive factors for seeking TCIM treatments in Europe, finding that only being female and having a self-reported chronic disease are predictive factors of seeking TCIM treatments. They concluded that they were unable to draw any conclusions for all other investigated factors. Similarly, a review

**Table 3**

Odds ratio (OR) and 95% confidence intervals (95%CI) of use of homeopathy, according to explanatory variables in the *Brazilian National Health Survey, 2019*.

Variables	Crude			Adjusted *		
	OR	95%CI	p-value	OR	95%CI	p-value
Gender			< 0.001			< 0.001
Male	1.00			1.00		
Female	2.37	1.81-3.10		2.18	1.67-2.85	
Age (years)			0.002			0.035
15/33	1.00			1.00		
34/51	1.45	1.05-2.00		1.22	0.87-1.72	
52/105	1.68	1.20-2.34		1.47	1.02-2.12	
Race/Color			< 0,001			0.004
Other	1.00			1.00		
White	3.21	2.46-4.17		1.49	1.14-1.96	
Schooling			< 0.001			< 0.001
Elementary	1.00			1.00		
High school	2.14	1.47-3.11		2.15	1.45-3.18	
Tertiary education	9.72	7.12-13.2		5.25	3.50-7.88	
Monthly income per capita (minimum wage)			< 0.001			< 0.001
Up to ½	1.00			1.00		
Up to 1	1.99	1.08-3.66		1.37	0.75-2.52	
Up to 2	3.65	2.10-6.37		1.70	0.96-3.02	
More than 2	13.6	8.2-22.6		3.53	1.93-6.44	
Lives with a partner			0.930			0.770
Yes	1.00			1.00		
No	1.01	0.78-1.30		1.04	0.80-1.35	
Private health insurance			< 0.001			0.055
No	1.00			1.00		
Yes	4.50	3.44-5.90		1.41	0.99-2.02	
Area			< 0.001			0.760
Rural	1.00			1.00		
Urban	3.64	2.48-5.35		1.06	0.71-1.59	
Country region			< 0.001			< 0.001
North/Northeast/Central-West	1.00			1.00		
South/Southeast	3.45	2.73-4.35		2.05	1.61-2.61	
Perception of health status			0.450			0.008
Very good/Good	1.00			1.00		
Regular/Poor/Very poor	0.89	0.66-1.19		1.51	1.11-2.05	
PHQ-9 score			< 0.001			0.002
0-9	1.00			1.00		
10-14	2.05	1.34-3.13		1.91	1.19-3.05	
> 14	2.38	1.51-3.75		2.17	1.32-3.57	

95%CI: 95% confidence interval; PHQ: *Patient Health Questionnaire*.

Note: N = 90,814 (32 missing information: race/color (10) and income (22)).

\* Adjusted by all variables.

with 110 articles highlighted the importance of understanding specific types of TCIM use in specific populations, suggesting that there is not a single profile that characterizes those seeking TCIM treatments<sup>11</sup>. However, whether these results can be used to characterize a profile of the homeopathy user is still unclear.

Few studies tried to evaluate the relation of sociodemographic characteristics and health status with homeopathy use. Many assessed community-based non-clinical populations. Overall, estimates vary between countries, depending on the analyzed predictive factor. A study evaluated homeopathy users' characteristics during the previous 12 months in 50,827 inhabitants from Central Norway, finding that female homeopathy users had higher education and more chronic complaints, whereas male ones were more likely to seek help for psychiatric complaints<sup>26</sup>. They failed to report an association between age, marital status, and perceived global health with visiting homeopathic treatment providers. Curiously, a previous study in the same geographic area found that people aged 60 or over were more likely to seek homeopathic treatment<sup>27</sup>. In France, a nationwide observational survey compared 6,379 patients who visited general practitioners (GPs) who prescribed only conventional medicines (GP-CM), regularly prescribed homeopathy within a mixed practice (GP-Mx), or are certified homeopathic GPs (GP-Ho). They concluded that patients attending a GP-Ho were slightly more often women with higher education than those in the GP-CM group and had markedly healthier lifestyles. They found no great differences regarding comorbidities or quality of life. Nevertheless, patients seeking care with a homeopath GP greatly differ in their healthier lifestyles, and positive attitude toward complementary medicine and natural treatments<sup>28</sup>. Another French study assessed the prevalence and characteristics of homeopathy users, in Caucasian 3,249 women and 2,937 men aged 35-74 years, randomly sampled from the complete list of Lausanne inhabitants<sup>29</sup>. Homeopathy use was positively associated with the female gender and higher educational attainment, but was unrelated to most common chronic diseases<sup>29</sup>. In Brazil, a probabilistic cross-sectional study with a cluster sampling of 3,080 participants reported, that the female gender and higher schooling and income were associated with homeopathy use<sup>30</sup>. Another Brazilian study with elderlies older adults ( $\geq 60$  years of age) ( $N = 23,815$ ) found that homeopathy used was associated with the female gender and with specific chronic diseases<sup>31</sup>. Until recently, Boccolini & Boccolini<sup>10</sup> conducted the largest population-based study in Brazil, using data from the PNS 2013. According to these authors, the wealthiest in the country were more likely to seek homeopathic and acupuncture treatments, whereas the poorest part of the population were more likely to use medicinal plants and herbal medicines. The sociodemographic profile of homeopathy users seen in these Brazilian studies agreed with our results.

The relation between self-reported health status and depression with TCIM, in general, and with homeopathy use, in particular, is also controversial. According to Peltzer & Pengpid<sup>12</sup>, poor health status, unhappiness, and depression were factors associated with seeking TCIM treatment. This higher use of TCIM practices among individuals with mental conditions and poorer health status may be due to an increased health-seeking behavior that which goes beyond conventional medicine<sup>32</sup>. However, an analysis to evaluate whether a self-perceived health status and psychological health are related to TCIM use yielded inconsistent results. The authors claimed that the cross-sectional designs employed in many studies are inappropriate to assess whether poor diagnosed or self-perceived health triggers TCIM use<sup>11</sup>.

Aiming to explain the relation between mental health conditions and homeopathy, Grolleau et al.<sup>14</sup> employed an interesting approach. They evaluated the association between patient characteristics with their lifetime use of homeopathic treatment for psychiatric symptoms in a sample of 36,785 persons participating in the *Mental Health Survey* in the general French population. They reported that 1.3% of participants were being received homeopathic treatment for psychiatric symptoms, and younger women and higher educational attainment were associated with homeopathy use. Compared to persons with no lifetime use of psychotropic drugs, those using homeopathy were more likely to show a diagnosis of mood or anxiety disorders. This general population study suggested that homeopathic treatment for psychiatric symptoms seems to be especially used to reduce anxiety symptoms. A nationwide evaluation of complementary medicine in Switzerland also found that homeopathy patients are more likely to be younger women with higher educational attainment who more often suffer from mental disorders than patients in conventional care<sup>33</sup>. In this study, poorer self-perceived health status and depression, which are closely related, were associated with homeopathy use even

after controlling for all covariates. We can offer some explanations for these findings. Davidson et al.<sup>34</sup> and Kessler et al.<sup>35</sup> analyzed data from a nationally representative survey of 2,055 respondents from the United States, finding that there is a more widespread use of TCIM among people with self-defined anxiety attacks and severe depression. Moreover, they are used as a complementary treatment rather than a substitute for conventional psychotropic drugs or psychotherapy<sup>35</sup>. Studies confirmed this practice among the general population<sup>36,37</sup>. Other reasons are dissatisfaction with conventional care<sup>38</sup> or patients' fear of the side effects of psychotropic drugs<sup>14</sup>. A previous study reported that persons with high educational attainment were less likely to use psychotropic treatments<sup>39</sup>. Finally, according to a Swiss longitudinal community study, TCIM users may also be, in general, more likely to be vulnerable to anxiety and depression<sup>40</sup>. The use of homeopathy as a main or complementary treatment for depression is intriguing, as the literature has scarce evidence on homeopathy efficacy in these cases. Randomized and controlled double-blind trials comparing homeopathy efficacy versus placebo to treatment of depression showed no difference between the placebo and homeopathy groups<sup>34</sup>. Nevertheless, a recent systematic review of randomized controlled trials for psychiatric disorders found that homeopathy more effectively treated major depression than fluoxetine. Note that this finding was based on the analysis of two trials with many methodological problems<sup>41</sup>.

A strength of our study is its use of data from a large national survey with complex sampling. PNS sampling included Brazilians from all regions of the country and from several socioeconomic strata, which enables us to generalize our results. Finally, PNS reported an overall 12-month prevalence of any TCIM practice, including homeopathy, making it potentially more representative of the general population than data from surveys of only one type of therapy.

However, this study also has some limitations. First, PNS 2019 is a cross-sectional study. Therefore, it stops us from inferring temporal causality. Second, we evaluated our main outcome regarding on homeopathy use via single direct question that which respondents could interpret differently. The prevalence of homeopathy use could be biased due to this lack of a clear definition of what is a homeopathic treatment. On one hand, participants may consider homeopathic treatments as different types of complementary and integrative formulas, such as medicinal plants and herbal medicines. On the other hand, homeopathic medicines can be consumed without a medical prescription, and consumers may fail not to consider the OTC use of homeopathy as a "medical treatment". Unfortunately, we lack medical data to confirm the use of homeopathy, as well of other types of complementary and integrative practices, which is a common problem in large population-based studies in the field. Finally, misclassification and recall bias are potential limitations of our study. In total, two factors contribute to these biases: the use of self-reports to assess our main outcome and explanatory variables, and the length of time the participants had to recall the homeopathic treatment (last 12 months). Nevertheless, the assessment of whether or not there was use of homeopathy in the last 12 months in the participants' self-report is commonly employed in this type of survey.

## Conclusions

In recent years, Brazil saw an expansion of TCIM practices being offered by SUS. Nevertheless, according to data from PNS 2013 and 2019, the prevalence of homeopathy use varied only from 0.6% to 0.99%, and the most people treated with homeopathy paid for their treatment. We also found a clear association between homeopathy use and certain characteristics, such as higher socioeconomic and educational status, and patients who are more often women suffering from depression. The literature requires further research to evaluate the direction of these associations. Additionally, studies about the effectiveness and cost-effectiveness of homeopathy among people suffering from depression and other medical conditions are needed.

## Contributors

A. Faisal-Cury contributed to the study conceptualization, writing and review. D. M. O. Rodrigues contributed to the study conceptualization and review.

## Additional informations

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## Resumo

Apesar da controvérsia sobre sua eficácia, a homeopatia é considerada uma prática médica alternativa ao modelo médico convencional. A prevalência de uso de homeopatia varia muito entre os países e há evidências conflitantes sobre a relação entre fatores sociodemográficos e condições de saúde associadas ao uso da homeopatia. Pretende-se estimar a prevalência de uso de homeopatia e sua associação com autopercepção de saúde, depressão de cada indivíduo e fatores sociodemográficos. Foram utilizados dados de 90.846 participantes da Pesquisa Nacional de Saúde de 2019 (PNS 2019), estudo de base populacional, com método amostral complexo e probabilístico. Foram coletados dados sociodemográficos, clínicos e informações sobre o uso da homeopatia nos últimos 12 meses. Para avaliar depressão, o Questionário de Saúde do Paciente-9 (PHQ-9) foi utilizado. Todas as variáveis foram categorizadas. Foram realizados modelos de regressão logística para obtenção de odds ratios (OR) brutos e ajustados e intervalos de 95% de confiança (IC95%). A prevalência de uso de homeopatia foi de 0,99% (IC95%: 0,98-1,00). Na análise ajustada, as seguintes variáveis estiveram associadas ao maior uso de homeopatia: mulheres, ter mais de 51 anos, ser branca, maior nível socioeconômico e educacional, residindo nas regiões Sul/Sudeste do país, pior estado de saúde autorreferido e depressão. No Brasil, houve um aumento na oferta de diferentes tipos de medicamentos complementares, incluindo a homeopatia. No entanto, o uso do tratamento da homeopatia é muito baixo e está claramente associado a um maior nível socioeconômico, pior estado de saúde autorreferido e depressão.

Homeopatia; Depressão; Terapias Complementares; Medicina Tradicional; Sistema Único de Saúde

## Resumen

A pesar de una controversia en cuanto a la eficacia, la homeopatía es un método terapéutico alternativo a la medicina convencional. La práctica de la homeopatía varía mucho entre países, y la evidencia existente es contradictoria cuanto a la relación entre los factores sociodemográficos y las condiciones de salud asociadas a ella. Se pretende estimar la prevalencia de la práctica de homeopatía y su asociación con la autopercepción del estado de salud, depresión y factores sociodemográficos. Se utilizaron datos de 90.846 participantes de la Encuesta Nacional de Salud de Brasil de 2019 (PNS 2019), estudio de base poblacional, con método de muestreo complejo y probabilístico. Se recogieron datos sociodemográficos, clínicos e información sobre la práctica de la homeopatía en los últimos 12 meses. El Cuestionario de Salud del Paciente-9 (PHQ-9) se utilizó para evaluar la depresión. Todas las variables fueron categorizadas. Se aplicaron modelos de regresión logística para obtener las razones de probabilidad (OR) crudas y ajustadas y los intervalos del 95% de confianza (IC95%). La prevalencia de la práctica de la homeopatía fue del 0,99% (IC95%: 0,98-1,00). En el análisis ajustado las siguientes variables se asociaron a un mayor empleo de la homeopatía: sexo femenino, tener más de 51 años, raza blanca, mayor nivel socioeconómico y educativo, residir en las regiones Sur/Sudeste del país, peor estado de salud autoidentificado y depresión. Hubo un aumento en Brasil en la prescripción de diferentes medicamentos complementarios, incluida la homeopatía. Sin embargo, la práctica del tratamiento de la homeopatía es muy baja y está asociada con un nivel socioeconómico más alto, peor estado de salud autoidentificado y depresión.

Homeopatía; Depresión; Terapias Complementarias; Medicina Tradicional; Sistema Único de Salud

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