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An evaluation of non-adherence to pharmacotherapy for chronic diseases and socioeconomic inequalities in Brazil

Avaliação da não adesão à farmacoterapia de doenças crônicas e desigualdades socioeconômicas no Brasil

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ABSTRACT: *Objective:* To evaluate non-adherence to pharmacotherapy for chronic diseases and to investigate the existence of socioeconomic inequalities related to this outcome in Brazil. *Methods:* This was a cross-sectional study based on data from the National Survey on Access, Use and Promotion of the Rational Use of Medicines (PNAUM). The study population corresponded to individuals aged 18 years or older with a medical diagnosis of at least one chronic disease and an indication for pharmacological treatment. The dependent variable was non-adherence to chronic disease pharmacotherapy measured by less than 80% adherence to drug therapy. Socioeconomic inequality related to non-adherence was assessed by absolute (SII) and relative (RII) inequality indices, calculated by logistic regression analyses. *Results:* The prevalence of non-adherence to pharmacotherapy in Brazil was 20.2%, ranging from 17.0 to 27.8% between regions. Furthermore, this study revealed absolute and relative socioeconomic inequalities in non-adherence to pharmacotherapy of chronic diseases in Brazil (SII = -7.4; RII = 0.69) and the Northeast (SII = -14.0; RII = 0.59) and Center West (SII = -20.8; RII = 0.38) regions. The probability of non-adherence to pharmacotherapy in Brazil was higher among individuals with worse socioeconomic status. *Conclusion:* The findings of the present study indicate the need for the restructuring and strengthening of public policies aimed at reducing socioeconomic inequalities, in order to promote equity in adherence to the pharmacotherapy associated with chronic diseases.

Keywords: Medication adherence. Chronic diseases. Socioeconomic factors. Epidemiology.

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RESUMO: *Objetivos:* Avaliar a não adesão à farmacoterapia de doenças crônicas e investigar a existência de desigualdades socioeconômicas relacionadas a esse desfecho no Brasil. *Métodos:* Estudo realizado com base em dados da Pesquisa Nacional sobre Acesso, Utilização e Promoção do Uso Racional de Medicamentos (PNAUM), de 2014. A população de estudo correspondeu a indivíduos com 18 anos ou mais, com diagnóstico médico de pelo menos uma doença crônica e com indicação de tratamento farmacológico. A variável dependente foi a não adesão à farmacoterapia de doenças crônicas, mensurada pela adesão menor que 80% à terapia medicamentosa. Avaliou-se a desigualdade socioeconômica relacionada a não adesão pelos índices absoluto (SII) e relativo (RII) de desigualdade, calculados por análise de regressão logística. *Resultados:* A prevalência de não adesão à farmacoterapia no Brasil foi de 20,2%, variando de 17 a 27,8% entre as regiões. Além disso, esse estudo revelou desigualdades socioeconômicas absoluta e relativa na não adesão à farmacoterapia de doenças crônicas no Brasil (SII = -7,4; RII = 0,69) e nas regiões Nordeste (SII = -14; RII = 0,59) e Centro-Oeste (SII = -20,8; RII = 0,38). A probabilidade de não adesão à farmacoterapia, no Brasil, é maior entre os indivíduos de pior condição socioeconômica. *Conclusão:* Os achados do presente estudo apontam a necessidade de reestruturação e fortalecimento das políticas públicas voltadas à redução das desigualdades socioeconômicas em prol da promoção da equidade na adesão à farmacoterapia de doenças crônicas.

Palavras-chave: Adesão à medicação. Doenças crônicas. Fatores socioeconômicos. Epidemiologia.

INTRODUCTION

Chronic diseases are the leading cause of death worldwide and represent one of the challenges of the 21st century, particularly in low and middle income countries[1]. In 2016, noncommunicable diseases were responsible for 41 of the 57 million deaths in the world[2]. In that same year, in Brazil, these diseases were responsible for 76% of deaths. Thus, chronic non-communicable diseases are the target of several prevention and treatment actions[3] Pharmacotherapy has been used to control the disease and improve patients' quality of life[4]. As such, a challenge for the success of pharmacotherapy is adherence to the recommended treatment[5].

Adherence can be defined as the extent to which a person's behavior – taking medication, following a diet or making lifestyle changes – corresponds to the recommendations in accordance with a health professional[6]. It is essential to the efficacy of all pharmacological therapies, but it is particularly critical in cases of chronic disease[7]. Non-adherence to pharmacotherapy leads to poor clinical results and increases healthcare costs, compromising the effectiveness of treatment[6]. According to the World Health Organization, the prevalence of non-adherence to pharmacotherapy is so alarming that the implementation of improvements in adherence to existing treatments may result in more health benefits than the development of new treatments[6].

Rates of adherence to pharmacotherapy are generally lower among patients with chronic conditions compared to those with acute conditions[8,9], and are affected by an individual's socioeconomic status. Poverty, education and medication costs are among the socioeconomic factors associated with adherence to therapy[6]. Some national and international studies

indicate a higher probability of adherence to chronic disease pharmacotherapy among people with higher income[10-12] and education levels[13,14], revealing inequalities between population subgroups. However, the investigation of inequalities in research related to non-adherence to pharmacotherapy is not common.

In Brazil, there is a lack of evidence regarding the magnitude of inequality in adherence to pharmacotherapy in relation to an individual's socioeconomic condition. The monitoring of socioeconomic inequalities in health over time is essential for the improvement of public policies aimed at reducing them[15]. As such, the data from the National Survey on Access, Use and Promotion of the Rational Use of Medicines (*Pesquisa Nacional sobre Acesso, Utilização e Promoção do Uso Racional de Medicamentos* – PNAUM) of 2014 — the first and most recent population-based household survey carried out in Brazil with the objective of evaluating access and rational use of medicines — allow for the investigation of inequalities in adherence to pharmacotherapy in order to build a first picture, which can be followed over time, with the continuation of PNAUM. Thus, the present study aimed to assess non-adherence to chronic disease pharmacotherapy in Brazil and to investigate the existence of socioeconomic inequalities related to this outcome.

METHOD

A study was carried out based on PNAUM data. The PNAUM sample was designed to be representative of the Brazilian population as a whole and of its regions. The research used a complex sampling plan in three stages of selection: municipalities, census tracts, and households[16]. Data were collected through individual interviews, with the application of questionnaires, in private households in urban areas of Brazil, with the inclusion of individuals aged 15 years or older. More details on sampling and data collection can be found in a methodological article by PNAUM[16].

In the present article, the study population consisted of adult individuals (18 years or older) interviewed at PNAUM, who had a medical diagnosis of at least one chronic disease and were recommended pharmacotherapy. Of the total of 33,450 individuals, 11,444 met the aforementioned inclusion criteria. Of these, 11,307 (99%) presented complete information for all study variables. The distribution by region generated a sample of 2,348 individuals for the North Region, 2,444 for the Northeast Region, 2,403 for the Southeast Region, 2,336 for the South Region and 1,776 for the Center West Region.

DEPENDENT VARIABLE

The dependent variable was non-adherence to pharmacotherapy for the treatment of the following chronic self-reported diseases: hypertension, diabetes, heart disease, high cholesterol, stroke, chronic lung disease, depression, and arthritis or rheumatism. The presence of each

disease, as well as the indication of pharmacological treatment, were detected, respectively, by the following questions: "Has any doctor ever told you that you have (name of the disease)?"; "Do you have a medical recommendation to use any medicine for (name of the disease)?". Individuals without a medical diagnosis or medication recommendation for the treatment of the disease were excluded. For individuals who answered "yes" to the above questions, adherence to pharmacotherapy was assessed by the question: "Are you taking any of these medicines?" Participants who answered "no" to this question were considered non-adherent. For the participants who answered "yes", the drugs used were listed and the following questions were asked: "In the past 30 days, have you been without any of the prescription drugs for some time?"

Among the individuals who said they had not been without any medication in the last 30 days, they were asked: "Is there any medicine that you should have been using, for the last 30 days, for (name of the disease), and aren't?". Participants who answered "no" adhered to the treatment of the disease in question, and those who answered "yes" did not adhere.

Among the individuals who said they had not been without any medication in the last 30 days, they were asked: Which one(s)? And "For how long?". Adherents were considered to be those individuals who reported having taken at least 80% of the dose prescribed for the treatment of the disease[17-20], asked by the following question: "Is there any medicine that you should have been using, for the last 30 days, for (name of the disease), and aren't?". Participants who answered "no" adhered to the treatment of the disease in question, and those who answered "yes" did not adhere.

These questions were asked individually, for each of the self-reported diseases. Thereafter, the measure of adherence to pharmacotherapy in this study was represented by the question: "Did the individual adhere to drug treatment for all of the diseases?". Adherence to pharmacotherapy corresponded to individuals who adhered to the treatment of all the diseases, that is, those who reported having taken at least 80% of the doses indicated for all prescribed drugs. The same cutoff point was used for all diseases, in order to guarantee the same parameter for the measurement of adherence to pharmacotherapy. The value of 80% of the doses was calculated based on use in the last 30 days. The presence of classification as "non-adherence" at any stage of the flowchart classifies the individual as non-adherent to pharmacotherapy. The definition of individuals who adhered and who did not adhere to pharmacotherapy for chronic self-reported diseases is shown schematically in Figure 1.

INDEPENDENT VARIABLES

The independent variable corresponded to the measure of socioeconomic classification represented by the categories of socioeconomic strata, according to the Socioeconomic Classification Criterion Brazil[21], whose classification was based on a points system for the following categories: A1; A2; B1; B2; C1; C2; D; E. In this study, the variable was recategorized into A /B; C; D; E, grouping individuals from strata A1, A2, B1 and B2 in A/B and individuals from strata C1 and C2 in C. The other categories remained unchanged. This measure
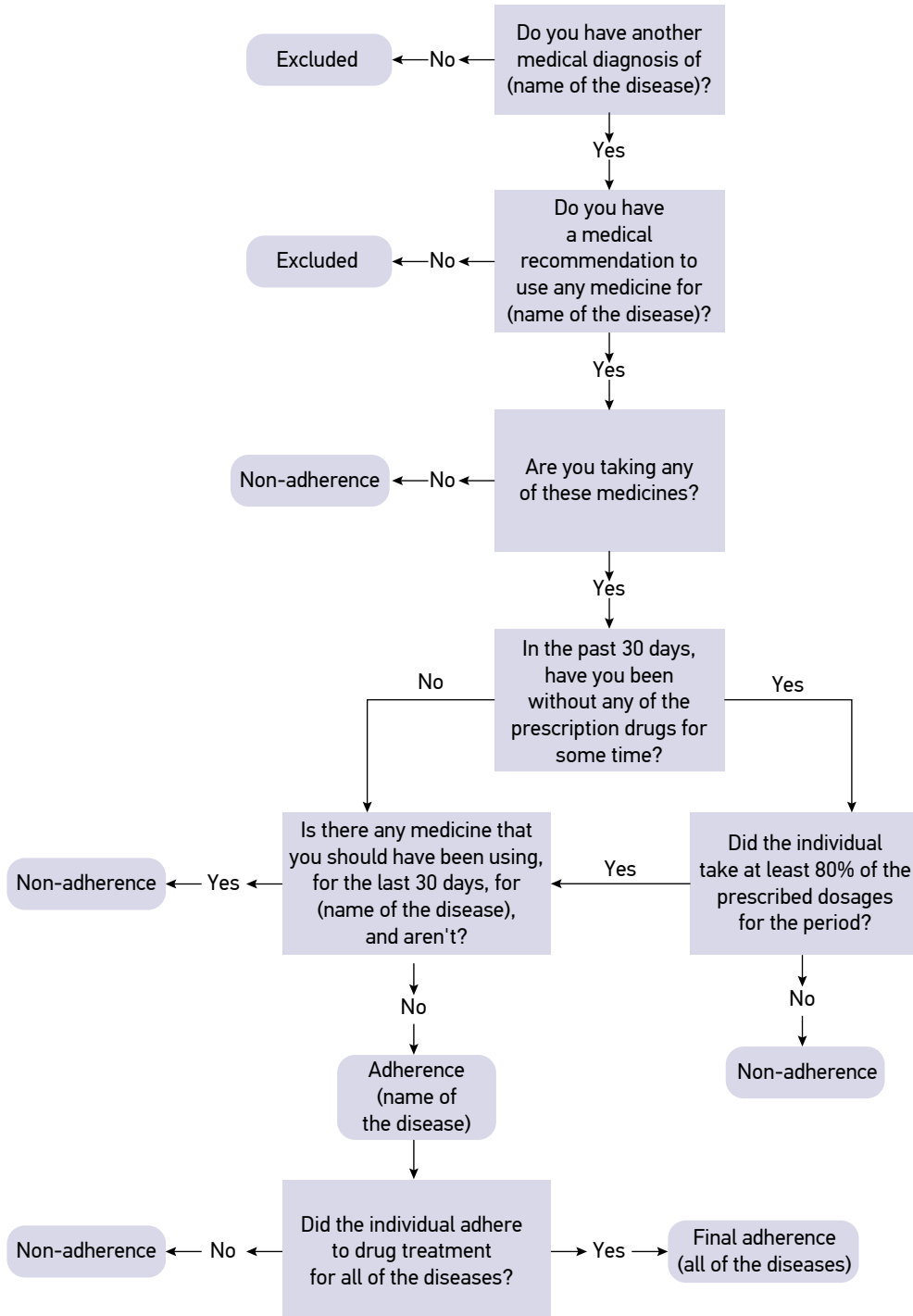
Figure 1. Flowchart to define the variable adherence to pharmacotherapy.

estimates the purchasing power of urban people and families, taking into account possession of goods and education of the head of the family[21]. The other covariables included to adjust the model were: sex, age and number of diseases with an indication for pharmacotherapy.

STATISTICAL ANALYSIS

Initially, a descriptive population analysis was carried out. Then, the distribution of non-adherence to pharmacotherapy in relation to the categories of socioeconomic strata for Brazil and each of its regions was examined, which was presented using the Equiplot graph.

Socioeconomic inequality related to non-adherence to pharmacotherapy was evaluated based on two complex measures of inequality: the absolute index of inequality (SII) and the relative index of inequality (RII). These indices were obtained based on regression analysis of the measure of non-adherence on the scores of relative socioeconomic position, achieved based on the measure of socioeconomic position (Criterion Brazil), taking into account the entire distribution of socioeconomic position[22]. The relative position score was obtained by ordering the sample from low to high, from individuals with lower purchasing power to those with higher purchasing power. Each economic classification group was assigned a value that corresponds to the midpoint of the cumulative measure distribution. Thus, individuals were classified from 0 to 1 according to socioeconomic position, with "0" representing the group with the lowest purchasing power and "1" representing the group with the highest purchasing power. The SII corresponds to the absolute difference in the probability of non-adherence to pharmacotherapy between individuals of greater and lesser socioeconomic status[23]. In the absence of inequality, SII receives a value of zero[22]. Negative values mean that the probability of non-adherence is more prevalent in the subgroup of the worst socioeconomic condition[23]. The RII is the ratio between the probabilities of non-adherence among individuals of higher and lower socioeconomic status. In the absence of inequality, RII has a value of one. This index only allows for positive values, with those less than one (<1), indicating the concentration of this indicator among those with the worst socioeconomic status[22]. The indices were estimated by logistic regression models adjusted for age, sex and number of diseases with indication for pharmacotherapy, stratified for Brazil and its regions.

Statistical analyzes were performed using the Stata 14.0 program (Stata Corporation, College Station, TX, United States), using the command svy, which considers the complex structure of the sample, including the allocation of sample weights and the design effect.

ETHICAL CONSIDERATIONS

PNAUM was approved by the National Research Ethics Committee of the National Health Council, through Report nº 398.131/2013. The database used is available on the website of the study[24].

RESULTS

The sample consisted mostly of women, people over the age of 40 and individuals belonging to socioeconomic stratum C (Table 1). In total, 11,307 individuals were observed.

The prevalence of non-adherence to pharmacotherapy in Brazil was 20.2% and, for the Northeast, North, Center West, Southeast and South regions, it was 27.8, 24.2, 21.5, 17.5 and 17%, respectively, with statistically significant differences (Table 2).

Figure 2 shows the distribution of the prevalence of non-adherence, for Brazil and regions, by categories of socioeconomic classification. In this graph, the socioeconomic stratum ranges from 1 to 4, corresponding to people with lower to higher purchasing power. A greater inequality gradient was observed in the North, Northeast and Center-West

Table 1. Description of the sample for Brazil, National Survey on Access, Use and Promotion of the Rational Use of Medicines (PNAUM), 2014.

Variable	N	% (95%CI)*
Sex		
Female	7,592	64.5 (63.2 – 65.9)
Male	3,715	35.5 (34.1 – 36.8)
Age		
18–39	1,033	14.5 (13.1 – 16.1)
40–59	4,159	42.4 (40.8 – 44.0)
60 or more	6,115	43.1 (41.3 – 44.9)
Socioeconomic classification		
A/B	2,334	24.1 (21.7 – 26.6)
C	6,375	54.4 52.5 – 56.4)
D	2,141	16.9 (15.2 – 18.8)
E	457	4.6 (3.9 – 5.3)
Region		
North	2,348	4.6 (3.6 – 5.9)
Northeast	2,444	21.2 (17.3 – 25.8)
Southeast	2,403	51.7 (45.8 – 57.6)
South	2,336	14.9 (12.0 – 18.4)
Center West	1,776	7.5 (5.9 – 9.6)
Number of diseases (average)	11,307	1.6 (1.6 – 1.6)

*N = 11,307; 95%CI: 95% confidence interval.

Table 2. Prevalence of non-adherence to pharmacotherapy. Brazil and regions, National Survey on Access, Use and Promotion of the Rational Use of Medicines (PNAUM), 2014.

	Non-adherence*
Brazil (n = 11,307)	20.2 (18.6; 22.0)
North (n = 2,348)	24.2 (19.8; 29.3)
Northeast (n = 2,444)	27.8 (24.8; 31.0)
Southeast (n = 2,403)	17.5 (14.9; 20.4)
South (n = 2,336)	17.0 (14.6; 19.6)
Center West (n = 1,776)	21.5 (18.9; 24.9)

*χ test^2 with Rao-Scott correction. Significant difference between Brazilian regions and non-adherence to pharmacotherapy; $p < 0.001$.
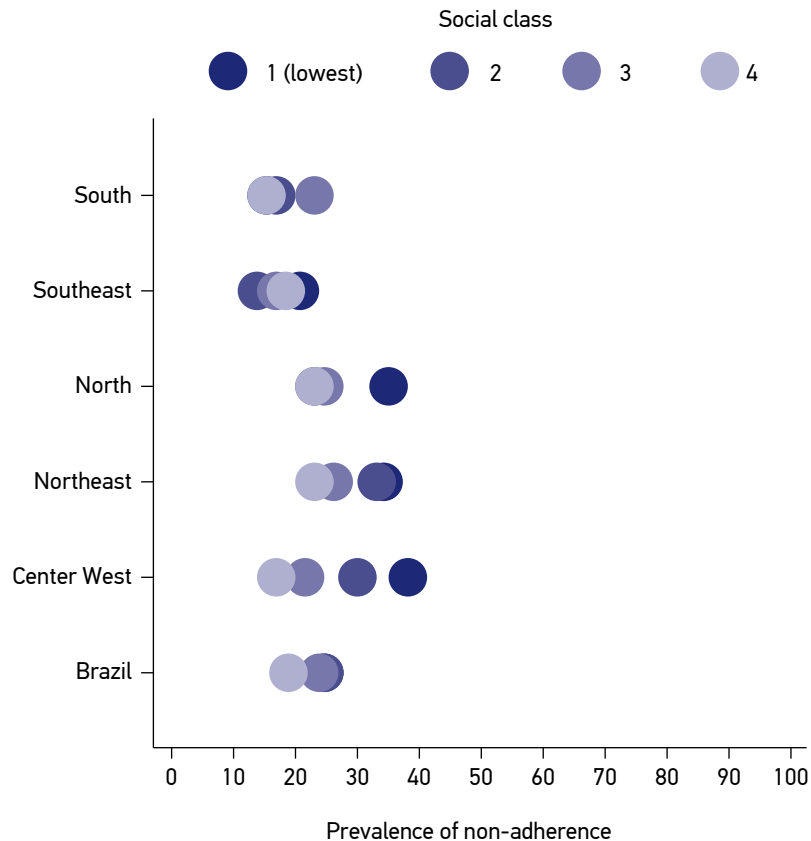
*Source: Brazilian Association of Research Companies (*Associação Brasileira de Empresas de Pesquisa*- ABEP)[21].

Figure 2. Distribution of non-adherence to pharmacotherapy in relation to the socioeconomic classification categories*. Brazil and regions. National Survey on Access, Use and Promotion of the Rational Use of Medicines (PNAUM), 2014.

regions, which is the only one with statistical significance. The probability of non-adherence to pharmacotherapy for the largest category of socioeconomic strata between regions was 23% (16.7; 30.8%) for the North Region, 22.2% (16; 29.8%) for the Northeast Region, 19.3% (14.6; 25.1%) for the Southeast Region, 15% (11.4; 19.5%) for the South Region and 16.5% (12.4; 21.7%) for the Center West Region. Higher prevalences of non-adherence to pharmacotherapy were observed among regions in individuals of the lowest category of socioeconomic stratum, with 35.6% (24; 49.2%) for the North Region, 33.5% (20.4; 39.7%) for the Northeast Region, 20.3% (13; 30.4%) for the Southeast Region, 16.9% (8.3; 31; 3%) for the South Region and 37.9% (22.5; 56.3%) for the Center West Region.

Table 3 shows the magnitude of the adjusted absolute (SII) and relative (RII) socioeconomic inequalities, related to non-adherence to pharmacotherapy, which were significant for Brazil [SII = -7.4 (95% confidence interval - 95%CI % -12.9; -1.8); RII = 0.69 (95%CI 0.50; 0.89)]. As for the regions that showed significant results, absolute inequalities were observed for the Northeast and Center West regions [Northeast: SII = -14 (95%CI -25.2; -2.9); Center West: SII = -20.8 (95%CI -30.5; -11.1)]. Relative inequalities were identified in the Northeast, South and Center West regions [Northeast: RII = 0.59 (95%CI 0.35; 0.84); South: RII = 0.67 (95%CI 0.35; 0.99); Center West: RII = 0.38 (95%CI 0.20; 0.56)].

DISCUSSION

The present study estimated the prevalence of non-adherence to chronic disease pharmacotherapy in the Brazilian population and quantified the magnitude of socioeconomic inequalities related to this outcome, demonstrating that the prevalence of non-adherence is unevenly distributed across socioeconomic strata and between geographic Brazilian regions.

Table 3. Coefficient of absolute (slope inequality index – SII) and relative (relative inequality index – RII) inequality of non-adherence to pharmacotherapy. Brazil and regions. National Survey on Access, Use and Promotion of the Rational Use of Medicines (PNAUM), 2014.

	SII (%)		RII	
	Crude (95%CI)	Adjusted* (95%CI)	Crude (95%CI)	Adjusted* (95%CI)
Brazil (n = 11,307)	-6.3 (-12.5; -0.0)	-7.4 (-12.9; -1.8)	0.73 (0.50; 0.96)	0.69 (0.50; 0.89)
North (n = 2,348)	-4.3 (-13.9; 5.3)	-7.5 (-16.9; 1.9)	0.84 (0.50; 1.17)	0.73 (0.45; 1.01)
Northeast (n = 2,444)	-15.4 (-28.1; -2.7)	-14.0 (-25.2; -2.9)	0.57 (0.30; 0.83)	0.59 (0.35; 0.84)
Southeast (n = 2,403)	4.4 (-4.8; 13.6)	2.4 (-5.6; 10.5)	1.29 (0.62; 1.96)	1.15 (0.62; 1.67)
South (n = 2,336)	-6.8 (-14.8; 1.2)	-6.8 (-14.9; 1.3)	0.67 (0.35; 0.99)	0.67 (0.35; 0.99)
Center West (n = 1,776)	-19.0 (-28.9; -9.1)	-20.8 (-30.5; -11.1)	0.42 (0.22; 0.61)	0.38 (0.20; 0.56)

*Index adjusted for age, sex and number of diseases with indication for pharmacological treatment; 95%CI: 95% confidence interval.

The likelihood of non-adherence to pharmacotherapy in Brazil was higher among individuals with lower socioeconomic status. Inequalities were not found in all regions of the country.

The prevalence of non-adherence to pharmacotherapy of 20.2% (95%CI 18.6; 22) found for Brazil was similar to the result observed in a systematic review of international studies on this subject over a span of 50 years[25]. Previous national studies have shown prevalence of non-adherence to pharmacotherapy ranging from 33 to 63.5%[14,26-29]. Despite the distinction between study populations and analysis methodologies, which requires caution when comparing these results, such studies show relevant rates of non-adherence to pharmacotherapy.

The significant differences observed for the prevalence of non-adherence to pharmacotherapy between Brazilian regions denote the regional inequalities existing in the country. The highest non-adherence rates found for the Northeast, North and Center West regions are in line with what was observed by other authors[14,16] and can be explained by the fact that, in these areas, there is less use and access to health services,[30-32] and lower proportions of access to medicines[33] compared to other regions.

The findings of the present investigation revealed greater probabilities of non-adherence to chronic disease pharmacotherapy among individuals with the worst socioeconomic conditions. The absolute and relative inequality rates were significant for Brazil, as a whole, and for the Northeast and Center West regions, highlighting the importance of investigating the particularities of each Brazilian region. In general, research has pointed out inequalities in adherence to pharmacotherapy between Brazilian regions[12,14], however the magnitude of intra-regional inequalities has not been explored.

When comparing the results of this work with those of others that investigated inequalities in adherence to pharmacotherapy regardless of a measure of inequality synthesis, it is observed that, in the research by Napolitano et al.[13], held in Italy, adherence to chronic disease pharmacotherapy was significantly higher among patients with a higher level of education when compared to patients with less education. Similarly, in Brazil, low adherence to pharmacotherapy for chronic diseases was greater among individuals with less education[14], however studies that evaluated specific chronic diseases showed divergent results. For example, in Sweden, there was no association between income and adherence to statin therapy, but adherence was lower among patients with a university education compared to those with only a primary education[34]. A systematic review by Pasma et al.[35] did not find conclusive results on the influence of socioeconomic status on adherence to the pharmacotherapy of inflammatory arthritis. The inconsistency in the associations was also verified in a systematic review related to non-adherence to medications for the treatment of arterial hypertension, which points to the need for further research with the use of different measures of socioeconomic position[36]. Most of the studies included in the systematic review found that the higher socioeconomic level reduced the estimated risk of non-adherence, but there were studies that demonstrated the opposite effect or lack of this association[36].

The inequality in non-adherence to chronic disease pharmacotherapy based on socioeconomic differences can be explained by different measures. In this study, a measure of

socioeconomic classification was adopted, which adds two important measures: education and possession of household goods[21].

Education is a strong determinant of employment and income, which reflects the individual's material and intellectual resources[37] and contributes to the more frequent use of health services[38]. Still, people with better education levels are less prone to difficulties in interpreting health information that are identified as predictors of non-adherence to pharmacotherapy[39]. In the same perspective, Chehuen Neto et al.[40] highlighted that lower levels of education lead to less knowledge about the disease and reduce the ability to understand medical instructions, which affects adherence to pharmacotherapy, as it interferes with the understanding of the need for the medication and the correct way to use it. The asset ownership measure includes information on a variety of durable assets, household characteristics and access to basic services. It emerged as an attempt to facilitate the measurement of family well-being in household surveys in low- and middle-income countries, considering the hypothesis that this set of variables can be used as a general indicator of material living standards[41].

Given the above, the free distribution of medicines for the treatment of chronic diseases by the Public Health System (*Sistema Único de Saúde* - SUS) is essential to reduce inequalities, as it represents the only way low-income families can access those supplies[42,43]. In addition, the creation of the Brazilian Popular Pharmacy Program *Programa Farmácia Popular do Brasil* (PFPB) has been important because it is another way to access essential medicines[44]. Both forms of dispensation reduce the financial barriers related to this access. However, expanding them without considering the obstacles related to education can increase inequalities, as proposed by the inverse equity principle[45]. Thus, new public health interventions would initially be incorporated by individuals with better socioeconomic conditions, until they were incorporated by those with worse conditions[45]. As such, the availability of the drug without adequate pharmaceutical assistance – which is based on care and includes the promotion of proper use and pharmacotherapeutic accompaniment, characteristics that are not always identified in the PFPB[46] and in the pharmacies of public health services[47] – does not contribute effectively to reducing inequalities in adherence.

Despite the advances made since the implementation of the pharmaceutical assistance policy and the development of different programs to expand access, they are still inadequate. Recently, it was found that the medicine supply from the primary health care units in the country was compromised due to the lack of supplies because of infrastructure problems in the dispensing units and deficiencies in supply logistics[48]. In addition, considering the current political and economic situation and the relevance of public funding for the free provision of medicines, there is a concern with the widening of inequalities, in view of the fiscal adjustment measures recently implemented[49]. Access to medications that is not free may lead to a compromise in family income[50] or favor non-adherence to treatment, due to the inability to purchase through direct payment[29].

The strong points of this study include its use of a representative sample of the Brazilian population. In addition, the measurement of the magnitude of inequality using complex

measures will serve as a parameter for direct comparison of the results of future studies. As limitations, it must be considered that complex measures of inequalities are affected by the prevalence of the analyzed event[23]. In addition, the adoption of self-reporting as a measure of adherence is susceptible to overestimation, due to the risk of false positive due to memory problems[51], but which can be mitigated by the use of a short recall period. It is worth mentioning that the assessment of the need to use the medication was based on self-report, and there may be bias regarding the real indication of the pharmacotherapy. In addition, the Criterion Brazil has the limitation of having been developed for the classification of populations living in urban areas[21].

This article brings advancements to this subject, since in addition to considering socioeconomic differences in adherence to pharmacotherapy, it also measures, based on more specific measures, the magnitude of inequalities between different socioeconomic strata. However, as the investigation of this type of inequality in studies on non-adherence to pharmacotherapy is still limited, it was not possible to make detailed comparisons of the results.

The results reveal important socioeconomic and regional inequalities in non-adherence to pharmacotherapy for chronic diseases in Brazil, which demand structured dialogue between researchers, health professionals and health managers, in order to promote equity and adherence to pharmacotherapy. In addition, this work highlights the need for future studies to investigate the causes of non-adherence to pharmacotherapy.

REFERENCES

1. World Health Organization. Global status report on noncommunicable diseases. Genebra: World Health Organization; 2014.

2. World Health Organization. Noncommunicable Diseases Country. Genebra: World Health Organization; 2018.

3. Alleyne G, Binagwaho A, Haines A, Jahan S, Nugent R, Rojhani A, et al. Embedding non-communicable diseases in the post-2015 development agenda. Lancet 2013; 381(9866): 566-74. https://doi.org/10.1016/S0140-6736(12)61806-6

4. Malta DC, Silva Junior JB. O plano de ações estratégicas para o enfrentamento das doenças crônicas não transmissíveis no Brasil e a definição das metas globais para o enfrentamento dessas doenças até 2025: uma revisão. Epidemiol Serv Saúde 2013; 22(1): 151-64. http://dx.doi.org/10.5123/S1679-49742013000100016

5. Sabate E. Adherence to Long-Term Therapies: Evidence for Action. Genebra: World Health Organization; 2003.

6. World Health Organization. Adherence to long term therapies: evidence for action. Genebra: World Health Organization; 2003.

7. Brown MT, Bussell JK. Medication Adherence: WHO Cares? Mayo Clin Proc 2011; 86(4): 304-14. https://doi.org/10.4065/mcp.2010.0575

8. Jackevicius CA, Mamdani M, Tu JV. Adherence with statin therapy in elderly patients with and without acute coronary syndromes. JAMA 2002; 288(4): 462-7. https://doi.org/10.1001/jama.288.4.462

9. Haynes RB, McDonald HP, Garg AX. Helping patients follow prescribed treatment: clinical applications. JAMA 2002; 288(22): 2880-3. https://doi.org/10.1001/jama.288.22.2880

10. Murphy A, Jakab M, McKee M, Richardson E. Persistent low adherence to hypertension treatment in Kyrgyzstan: How can we understand the role of drug affordability? Health Policy Plan 2016; 31(10): 1384-90. https://doi.org/10.1093/heapol/czw080

11. Awwad O, Akour A, Al-Muhaissen S, Morisky D. The influence of patients' knowledge on adherence to their chronic medications: a cross-sectional study in Jordan. Int J Clin Pharm 2015; 37(3): 504-10. https://doi.org/10.1007/s11096-015-0086-3

12. Ferreira RA, Barreto SM, Giatti L. Self-reported hypertension and non-adherence to continuous-use medication in Brazil: a population-based study. Cad Saúde Pública 2014; 30(4): 815-26. https://doi.org/10.1590/0102-311X00160512

13. Napolitano F, Napolitano P, Angelilo IF. Medication adherence among patients with chronic conditions in Italy. Eur J Public Health 2016; 26(1): 48-52. https://doi.org/10.1093/eurpub/ckv147

14. Tavares NUL, Bertoldi AD, Mengue SS, Arrais PSD, Luiza VL, Oliveira MA, et al. Factors associated with low adherence to medicine treatment for chronic diseases in Brazil. Rev Saúde Pública 2016; 50(Supl. 2): 10s. https://doi.org/10.1590/s1518-8787.2016050006150

15. Khang YH, Yun S, Lynch J. Monitoring trends in socioeconomic health inequalities: it matters how you measure. BMC Public Health 2008; 8: 66. https://doi.org/10.1186/1471-2458-8-66

16. Mengue SS, Bertoldi AD, Boing AC, Tavares NUL, da Silva Dal Pizzol T, Oliveira MA, et al. Pesquisa Nacional sobre Acesso, Utilização e Promoção do Uso Racional de Medicamentos (PNAUM): métodos do inquérito domiciliar. Rev Saúde Pública 2016; 50(Supl. 2): 4s. https://doi.org/10.1590/S1518-8787.2016050006156

17. Winkler A, Teuscher AU, Mueller B, Diem P. Monitoring adherence to prescribed medication in type 2 diabetic patients treated with sulfonylureas. Swiss Med Wkly 2002; 132(27-28): 379-85. https://doi.org/2002/27/smw-10036

18. Osterberg L, Blaschke T. Adherence to medication. N Engl J Med 2005; 353(5): 487-97. https://doi.org/10.1056/NEJMra050100

19. Silva AP, Hill P, Belo MT, Rabelo SG, Menzies D, Trajman A. Non-completion of latent tuberculous infection treatment among children in Rio de Janeiro State, Brazil. Int J Tuberc Lung Dis 2016; 20(4): 479-86. https://doi.org/10.5588/ijtld.15.0609

20. Leite SN, Vasconcelos MPC. Adesão à terapêutica medicamentosa: elementos para a discussão de conceitos e pressupostos adotados na literatura. Ciênc Saúde Coletiva 2003; 8(3): 775-82. https://doi.org/10.1590/S1413-81232003000300011

21. Associação Brasileira de Empresas de Pesquisa. Critério de Classificação Econômica Brasil 2013 [Internet]. Associação Brasileira de Empresas de Pesquisa [acessado em 17 abr. 2019]. Disponível em: http://www.abep.org/criterio-brasil

22. Health Equity Assessment Toolkit. Software for exploring and comparing health inequalities in countries. Built-in database edition. Version 2.0. Genebra: World Health Organization; 2017.

23. World Health Organization. Handbook on Health Inequality Monitoring: with a special focus on low and middle income countries. Genebra: World Health Organization; 2013.

24. Pesquisa Nacional sobre Acesso, Utilização e Promoção do Uso Racional de Medicamentos no Brasil. Microdados [Internet]. [acessado em 30 abr. 2019]. Disponível em: http://www.ufrgs.br/pnaum/documentos/micro-dados

25. DiMatteo MR. Variations in patients' adherence to medical recommendations: a quantitative review of 50 years of research. Med Care 2004; 42(3): 200-9. https://doi.org/10.1097/01.mlr.0000114908.90348.f9

26. Girotto E, Andrade SM, Cabrera MA, Matsuo T. Adesão ao tratamento farmacológico e não farmacológico e fatores associados na atenção primária da hipertensão arterial. Ciênc Saúde Coletiva 2013; 18(6): 1763-72.

27. Remondi FA, Cabrera MAS, Souza RKT. Não adesão ao tratamento medicamentoso contínuo: prevalência e determinantes em adultos de 40 anos e mais. Cad Saúde Pública 2014; 30(1): 126-36. https://doi.org/10.1590/0102-311X00092613

28. Santa-Helena ETD, Nemes MIB, Eluf Neto J. Fatores associados à não-adesão ao tratamento com anti-hipertensivos em pessoas atendidas em unidades de saúde da família. Cad Saúde Pública 2010; 26(12): 2389-98. https://doi.org/10.1590/S0102-311X2010001200017

29. Tavares NUL, Bertoldi AD, Thumé E, Facchini LA, França GVA, Mengue SS. Fatores associados à baixa adesão ao tratamento medicamentoso em idosos. Rev Saúde Pública 2013; 47(6): 1-9. https://doi.org/10.1590/S0034-8910.2013047004834

30. Viacava F, Bellido J. Condições de saúde, acesso a serviços e fontes de pagamento, segundo inquéritos domiciliares. Ciênc Saúde Coletiva 2016; 21(2): 351-70. https://doi.org/10.1590/1413-81232015212.19422015

31. Osorio RG, Servo LMS, Piola SF. Necessidade de saúde insatisfeita no Brasil: uma investigação sobre a não procura de atendimento. Ciênc Saúde Coletiva 2011; 16(9): 3741-54. https://doi.org/10.1590/S1413-81232011001000011

32. Travassos C, Oliveira EXG, Viacava F. Desigualdades geográficas e sociais no acesso aos serviços de saúde no Brasil: 1998 e 2003. Ciênc Saúde Coletiva 2006; 11(4): 975-86. https://doi.org/10.1590/S1413-81232006000400019

33. Drummond ED, Simões TC, Andrade FB. Acesso da população brasileira adulta a medicamentos prescritos. Rev Bras Epidemiol 2018; 21: e180007. https://doi.org/10.1590/1980-549720180007

34. Sjölander M, Eriksson M, Glader EL. Inequalities in medication adherence to statin treatment after stroke: A nationwide observational study. Eur Stroke J 2016; 1(2): 101-7. https://dx.doi.org/10.1177%2F2396987316646026

35. Pasma A, Van't Spijker A, Hazes JM, Busschbach JJ, Luime JJ. Factors associated with adherence to pharmaceutical treatment for rheumatoid arthritis patients: A systematic review. Semin Arthritis Rheum 2003; 43(1): 18-28. https://doi.org/10.1016/j.semarthrit.2012.12.001

36. Alsabbagh MH, Lemstra M, Eurich D, Lix LM, Wilson TW, Watson E, et al. Socioeconomic status and nonadherence to antihypertensive drugs: a systematic review and meta-analysis. Value Health 2014; 17(2): 288-96. https://doi.org/10.1016/j.jval.2013.11.011

37. Galobardes B, Shaw M, Lawlor DA, Lynch JW, Smith GD. Indicators of socioeconomic position. J Epidemiol Community Health 2006; 60(1): 7-12. https://doi.org/10.1136/jech.2004.023531

38. Szwarcwald CL, Souza-Júnior PBR, Damacena GN. Socioeconomic inequalities in the use of outpatient services in to health care need: evidence from the World Health Survey. BMC Health Serv Res 2010; 10: 217. https://doi.org/10.1186/1472-6963-10-217

39. Lee YM, Yu HY, You, Son YJ. Impact of health literacy on medication adherence in older people with chronic diseases. Colleguian 2017; 24(1): 11-8. https://doi.org/10.1016/j.colegn.2015.08.003

40. Chehuen Neto JA, Costa La, Estevanin GM, Bignoto TC, Vieira CIR, Pinto FAR, et al. Functional Health Literacy in chronic cardiovascular patients. Ciênc Saúde Coletiva 2019; 24(3): 1121-32. https://doi.org/10.1590/1413-81232018243.02212017

41. Rutstein, SO, Kiersten J. The DHS Wealth Index. DHS Comparative Reports No. 6. Maryland: ORC Macro; 2004.

42. Barreto MNSC, Cesse EAP, Lima RF, Marinho MGS, Specht YS, Carvalho EMF, et al. Análise do acesso ao tratamento medicamentoso para hipertensão e diabetes na Estratégia de Saúde da Família no Estado de Pernambuco, Brasil. Rev Bras Epidemiol 2015; 18(2): 413-24. https://doi.org/10.1590/1980-5497201500020010

43. Helfer AP, Camargo AL, Tavares NUL, Kanavos P, Bertoldi AD. Capacidade aquisitiva e disponibilidade de medicamentos para doenças crônicas no setor público. Rev Panam Salud Publica 2012; 31(3): 225-32.

44. Brasil. Presidência da República. Decreto nº 5.090, de 20 de maio de 2004. Regulamenta a Lei nº 10.858, de 13 de abril de 2004, e institui o programa "Farmácia Popular do Brasil", e dá outras providências. Diário Oficial da União 2004.

45. Victora CG, Wagstaff A, Schellenberg JA, Gwatkin D, Claeson M, Habicht JP Applying an equity lens to child health and mortality: more of the same is not enough. Lancet 2003; 362(9379): 233-41. https://doi.org/10.1016/S0140-6736(03)13917-7

46. Silva RM, Caetano R. Programa "Farmácia Popular do Brasil": caracterização e evolução entre 2004-2012. Ciênc Saúde Coletiva 2015; 20(10): 2943-56. https://doi.org/10.1590/1413-812320152010.17352014

47. Oliveira LCF, Assis MMA, Barboni AR. Assistência Farmacêutica no Sistema Único de Saúde: da Política Nacional de Medicamentos à Atenção Básica à Saúde. Ciênc Saúde Coletiva 2010; 15(Supl. 3): 3561-7. https://doi.org/10.1590/S1413-81232010000900031

48. Nascimento RCRM, Álvares J, Guerra Júnior AA, Gomes IC, Costa EA, Leite SN, et al. Disponibilidade de medicamentos essenciais na atenção primária do Sistema Único de Saúde. Rev Saúde Pública 2017; 51(Supl. 2): 10s. https://doi.org/10.11606/s1518-8787.2017051007062

49. Brasil. Constituição (1998). Emenda constitucional nº 95, de 15 de dezembro de 2016. Teto dos gastos públicos. Altera o Ato das Disposições Constitucionais Transitórias, para instituir o Novo Regime Fiscal, e dá outras providências. Diário Oficial da União 2016.

50. Boing AC, Bertoldi AD, Peres KG. Desigualdades socioeconômicas nos gastos e comprometimento da renda com medicamentos no Sul do Brasil. Rev Saúde Pública 2011; 45(5): 897-905. https://doi.org/10.1590/S0034-89102011005000054

51. Lehmann A, Aslani P, Ahmed R, Celio J, Gauchet A, Bedouch P, et al. Assessing medication adherence: options to consider. Int J Clin Pharm 2014; 36(1): 55-69. https://doi.org/10.1007/s11096-013-9865-x