

# Socioeconomic Inequalities in Non-Adherence to Antihypertensive Medication in Peru

## Desigualdades socioeconómicas en la falta de adherencia a la medicación antihipertensiva en Perú

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## ABSTRACT

**Introduction:** In Peru, adherence to antihypertensive treatment ranges from 55.5% to 46.6%. Adherence decreases under adverse socioeconomic conditions. **Objective:** The aim of this research was to evaluate the socioeconomic inequalities in non-adherence to antihypertensive medication in Peru. **Methods:** A cross-sectional study was conducted through the analysis of data from the Demographic and Family Health Survey carried out in Peru between 2013 and 2023. We addressed the socioeconomic conditions of hypertensive Peruvian adults, including sex, age group, educational level, area or place of residence, and health insurance. These conditions were evaluated as sources of inequality in non-adherence to antihypertensive medication at a general level using the Concentration Index (CI) or Erreygers' Concentration Index (ECI) among hypertensive adults over 29 years old. **Results:** In the 15,624 hypertensive adults older than 29 years included in the study, 86.63% were adherent to their antihypertensive medication. However, the inequality in medication non-adherence was considerable (CI: -0.259; 95%CI: -0.385 to -0.132;  $p < 0.001$ ). This inequality was greater among those aged 30 to 49 years (CI: -0.064; 95%CI: -0.121 to -0.008;  $p = 0.012$ ), those living in rural areas (CI: -0.484; 95%CI: -0.537 to -0.430;  $p < 0.001$ ) or outside the capital (CI: -0.495; 95%CI: -0.569 to -0.422;  $p < 0.001$ ), and those with no education (CI: -0.156; 95%CI: -0.201 to -0.112;  $p < 0.001$ ) or only primary education (CI: -0.323; 95%CI: -0.386 to -0.260;  $p < 0.001$ ). In contrast, hypertensive adults with university studies had a positive CI (CI: 0.257; 95%CI: 0.199 to 0.316;  $p < 0.001$ ). **Conclusions:** Peruvian hypertensive adults residing in rural areas or outside the capital, and those with low educational level, showed greater inequality in adherence to antihypertensive medication.

**Keywords:** Socioeconomic Health Disparities; Health Inequality Monitoring; Health Inequities; Hypertension; Treatment Adherence and Compliance; Antihypertensive Agents; Peru.

## RESUMEN

**Introducción:** En Perú, la adherencia al tratamiento antihipertensivo varía entre el 55.5% y el 46.6%. La adherencia disminuye en condiciones socioeconómicas adversas. **Objetivo:** El objetivo de esta investigación fue evaluar las desigualdades socioeconómicas en la no adherencia a la medicación antihipertensiva en Perú. **Métodos:** Se realizó un estudio transversal a través del análisis de datos de la Encuesta Demográfica y de Salud Familiar llevada a cabo en Perú entre 2013 y 2023. Se abordaron las condiciones socioeconómicas de adultos peruanos hipertensos, incluyendo sexo, grupo de edad, nivel educativo, área o lugar de residencia, y seguro de salud. Estas condiciones fueron evaluadas como fuentes de desigualdad en la no adherencia a la medicación antihipertensiva a nivel general, utilizando el Índice de Concentración (IC) o el Índice de Concentración de Erreygers (ICE) entre adultos hipertensos mayores de 29 años. **Resultados:** En los 15,624 adultos hipertensos mayores de 29 años incluidos en el estudio, el 86.63% eran adherentes a su medicación antihipertensiva. Sin embargo, la desigualdad en la no adherencia a la medicación fue considerable (IC: -0.259; IC95%: -0.385 a -0.132;  $p < 0.001$ ). Esta desigualdad fue mayor entre los de 30 a 49 años (IC: -0.064; IC95%: -0.121 a -0.008;  $p = 0.012$ ), aquellos que viven en zonas rurales (IC: -0.484; IC95%: -0.537 a -0.430;  $p < 0.001$ ) o fuera de la capital (IC: -0.495; IC95%: -0.569 a -0.422;  $p < 0.001$ ), y aquellos sin educación (IC: -0.156; IC95%: -0.201 a -0.112;  $p < 0.001$ ) o con solo educación primaria (IC: -0.323; IC95%: -0.386 a -0.260;  $p < 0.001$ ). En contraste, los adultos hipertensos con estudios universitarios tuvieron un IC positivo (IC: 0.257; IC95%: 0.199 a 0.316;  $p < 0.001$ ). **Conclusiones:** Los adultos hipertensos peruanos que residen en áreas rurales o fuera de la capital, y aquellos con un bajo nivel educativo, mostraron mayor desigualdad en la adherencia a la medicación antihipertensiva.

**Palabras clave:** Desigualdades Socioeconómicas en Salud; Monitoreo de Desigualdades en Salud; Inequidades en Salud; Hipertensión; Adherencia y Cumplimiento del Tratamiento; Agentes Antihipertensivos; Perú.

## INTRODUCTION

The World Health Organization estimates that approximately 1.28 billion adults worldwide, aged between 30 and 79 years, suffer from hypertension (1). Additionally, of every three adults with hypertension, two were from middle- and low-income countries. Only 42% of hypertensive adults receive medical treatment, while 21% have their blood pressure under control and 50% do not adhere to therapeutic guidelines (2), which can lead to the development of severe complications, such as myocardial infarction, cerebrovascular accidents, renal failure, and other health issues (3).

The WHO provides a model with five dimensions that influence how well patients adhere to their treatment: economic factors, healthcare system elements, treatment-related factors, disease-related factors, and personal factors (4,5). By 2025, emerging countries in Latin America are projected to have 1.56 billion cases of hypertension, coinciding with the World Health Assembly's goal of reducing uncontrolled blood pressure by 25% (6-8).

In Peru, adherence to antihypertensive treatment affects the quality of life, work productivity, and healthcare expenses (9). This lack of adherence highlights the necessity to introduce tailored health education initiatives and individualized support services to encourage proper treatment adherence (10). Additionally, factors such as lack of health knowledge, noncompliance with therapeutic guidelines, and medication costs contribute to this lack of adherence. Other influencing factors include ageing, education, income, area of residence, healthcare coverage, and psychosocial conditions (11,12).

The hypertension management guidelines in Peru overlook patient adherence to treatment, worsening the task of guaranteeing efficient hypertension management and leading to less-than-optimal health results, revealing a notable flaw in the health care system (13,14). Neglecting sociodemographic variations in medication access and overlooking gaps in adherence awareness can severely affect treatment effectiveness, resulting in poor optimal health outcomes and difficulties in achieving successful hypertension management (15,16). Thus, the objective of this study was to assess socioeconomic inequalities in nonadherence to antihypertensive medication in Peru.

## METHODOLOGY

### Study Design

A cross-sectional study was conducted with an analysis of the Demographic and Family Health Survey from Peru ( ENDES, Spanish acronym). Peru is a Latin American country with almost 32 million people (17). This study analyzed hypertensive adults who responded to the assessment of their antihypertensive medication adherence and had their blood pressure measured using the ENDES between 2013 and 2022.

### Variables Assessed

Hypertensive adults were asked, 'Did you take the medications as your doctor prescribed?'. This allowed the evaluation of medication adherence. Additionally, other variables were evaluated, including sex (male or female), age group (30-49, 50-64, and  $\geq 65$  years), education level (no education, elementary, high school, or university), wealth quintile (first, second, third, fourth, and fifth quintile), area (rural or urban), place of residence (living in or outside the capital), and health insurance affiliation (yes or no).

### Control of Blood Pressure

Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were measured in hypertensive adults. In this way, considering the blood pressure ranges stipulated by clinical practice guidelines for hypertension management (18). We considered SBP values below 130 mmHg and DBP values below 80 mmHg healthy. Thus, we evaluated medication adherence in hypertensive adults and the range of SBP/DBP they maintained. Additionally, we addressed the differences that exist according to the wealth quintile to evaluate inequality in medication adherence based on blood pressure.

### Statistical Analysis

The statistical analysis was conducted using R Studio version 4.2.2 (<https://cran.r-project.org/>), including the complex sample design inherent to ENDES. Categorical variables were described using frequencies and percentages, whereas numerical variables were presented as means with their respective 95% confidence intervals weighted by the design effect. Differences in medication intake among adults across study variables were assessed using the Rao-Scott test. Thus, the association between sociodemographic characteristics and medication intake was assessed using Poisson regression models with robust variances to estimate both the crude Prevalence Ratio (PRc) and the adjusted prevalence (aPR), accounting for all variables.

### Inequality Analysis

An inequality analysis was conducted using a concentration index to assess medication intake based on socioeconomic status, ranging from the fifth quintile to the first quintile. Therefore, the Concentration Index (CI) was determined by estimating the area above or below the curve. Thus, the conditions that generate clustering above the curve are linked to inequality caused by poverty (19). Additionally, the Erreygers' Concentration Index (ECI) was employed to allow for a more equitable estimation by considering the extremes of the distribution of the evaluated health condition (20). A map of Peru was created to show where hypertensive adults were located, their medication intake, and the ECI values in different regions.

### Ethical Aspects

Given that the ENDES data collection process involved the participants' informed consent, no ethical committee evaluation was necessary. Moreover, the data obtained from the INEI platform were anonymized and securely stored (<https://proyectos.inei.gob.pe/microdatos/>).

## RESULTS

Of the 15,624 Peruvian adults aged > 29 years with arterial hypertension included in the study, 62.95% (95%CI: 61.49 to 64.39) were female, with a mean age of 64.44 years (95%CI: 63.97 to 64.85). Nearly half of the respondents were aged 65 years or older (51.83%, 95%CI: 50.25 to 53.39), had completed secondary education or higher (56.48%, 95%CI: 55.09 to 57.86), and belonged to the first two quintiles of wealth (52.61%, 95%CI: 51.01 to 54.22). Regarding place of residence, 43.38% (95%CI: 41.77 to 45.00) lived in the capital, whereas 84.11% (95%CI: 83.16 to 85.00) resided in urban areas.

Regarding health insurance affiliation, 87.77% (95%CI: 86.55 to 88.90) were affiliated with some form of insurance. Meanwhile, 86.63% (95%CI: 85.46 to 87.72) of participants adhered to the intake of antihypertensive medications as prescribed by their doctors.

Certain sociodemographic characteristics, such as age group, educational level, wealth quintile, and place of residence, mediated the statistically significant differences ( $p < 0.050$ ) in the proportion of hypertensive adults taking medication for their condition (Table 1).

Specifically, it was found that hypertensive adults living in rural areas had a 5.61% higher prevalence of adherence to medication intake (PRa: 1.056; 95% CI: 1.007–1.108;  $p = 0.025$ ) than hypertensive adults in urban areas. Adults in the third, fourth, and fifth wealth quintiles, on the other hand, were less likely to take their antihypertensive medications (Table 2). This was because 4.76%, 6.29%, and 12.07% of those in these groups did not take their medications as prescribed. In addition, compared to hypertensive adults aged 65 years or older, those aged 50–64 years and 30–49 years had rates of 5.51% (PRa: 0.945; 95%CI: 0.914–0.976;  $p = 0.001$ ) and 6.85% (PRa: 0.931; 95%CI: 0.897–0.968;  $p = 0.001$ ) not taking their blood pressure medications as prescribed.

A considerable difference was found between adults with high blood pressure with non-adherence to their medications (CI: -0.259; 95%CI: -0.385 to -0.132;  $p < 0.001$ ) and those who took their antihypertensive medication as prescribed (CI: 0.038; 95%CI: 0.012 to 0.063;  $p = 0.004$ ) (Figure 1A).

Also, among hypertensive adults who were taking their medications, there was more inequality among those with only elementary education (CI: -0.287; 95%CI: -0.373 to -0.200;  $p < 0.001$ ), living in rural areas (CI: -0.853; 95%CI: -1.031 to -0.675;  $p < 0.001$ ), or not living in the capital (CI: -0.441; 95%CI: -0.631 to -0.251;  $p < 0.001$ ), compared to those with a university education (CI: 0.257; 95%CI: 0.199 to 0.316;  $p < 0.001$ ). In addition, among adults with high blood pressure who did not take their medicine as prescribed, those with only primary education (CI: -0.279; 95% CI: -0.538 to -0.019;  $p = 0.036$ ), living in rural areas (CI: -0.976; 95%CI: -1.426 to -0.527;  $p < 0.001$ ), or outside the capital (CI: -0.402; 95%CI: -0.596 to -0.207;  $p < 0.001$ ) were more unequal (Figure 2A) than those with a university education (CI: 0.508; 95%CI: 0.257 to 0.758;  $p < 0.001$ ).

TABLE 1. SOCIODEMOGRAPHIC CHARACTERISTICS OF PERUVIAN ADULTS WITH ARTERIAL HYPERTENSION ACCORDING TO TREATMENT ADHERENCE

Variables	Hypertensive adults with non-adherence to their medications (N=2,252)		Hypertensive adults with adherence to their medications (N=13,372)		P-value**
	n	%* (95%CI)	n	%* (95%CI)	
<b>Sex?</b>					
Male	796	12.08 (10.58 to 13.76)	4,716	87.92 (86.24 to 89.42)	0.070
Female	1,456	14.13 (12.67 to 15.72)	8,656	85.87 (84.28 to 87.33)	
<b>Age Group?</b>					
30 to 49 years	651	17.31 (15.24 to 19.60)	2,681	82.69 (80.40 to 84.76)	<0.001
50 to 64 years	782	16.06 (13.79 to 18.63)	4,255	83.94 (81.37 to 86.21)	
65 or more years	819	10.49 (9.16 to 11.98)	6,436	89.51 (88.02 to 90.84)	
<b>Educational Level?</b>					
Without Education	291	13.99 (11.60 to 16.78)	1,588	86.01 (83.22 to 88.40)	<0.001
Elementary	808	12.86 (11.48 to 14.37)	5,184	87.14 (85.63 to 88.52)	
High School	727	16.04 (13.90 to 18.43)	3,632	83.96 (81.57 to 86.10)	
University	425	10.54 (9.04 to 12.26)	2,964	89.46 (87.74 to 90.96)	
<b>Wealth Index?</b>					
Q5 (poorest)	631	17.31 (15.04 to 19.85)	3,039	82.69 (80.15 to 84.96)	<0.001
Q4	511	15.36 (13.52 to 17.40)	2,812	84.64 (82.60 to 86.48)	
Q3	458	14.85 (12.59 to 17.44)	2,481	85.15 (82.56 to 87.41)	
Q2	371	13.72 (10.91 to 17.13)	2,423	86.28 (82.87 to 89.09)	
Q1 (richest)	281	9.44 (7.58 to 11.70)	2,617	90.56 (88.30 to 92.42)	
<b>Area of Residence?</b>					
Urban	1,906	14.54 (13.04 to 16.18)	10,817	85.46 (83.82 to 86.96)	0.180
Rural	346	13.15 (11.89 to 14.51)	2,555	86.85 (85.49 to 88.11)	
<b>Place of Residence?</b>					
Other Regions	712	14.58 (13.31 to 15.96)	3,763	85.42 (84.04 to 86.69)	0.025
Capital	1,540	11.78 (9.97 to 13.87)	9,609	88.22 (86.13 to 90.03)	
<b>Health Insurance?</b>					
No	313	15.88 (13.09 to 19.14)	1,387	84.12 (80.86 to 86.91)	0.055
Yes	1,782	12.87 (11.65 to 14.18)	11,189	87.13 (85.82 to 88.35)	

\* Estimated percentage considering the weighting factor.

\*\*P-value estimated with the Rao-Scott test.

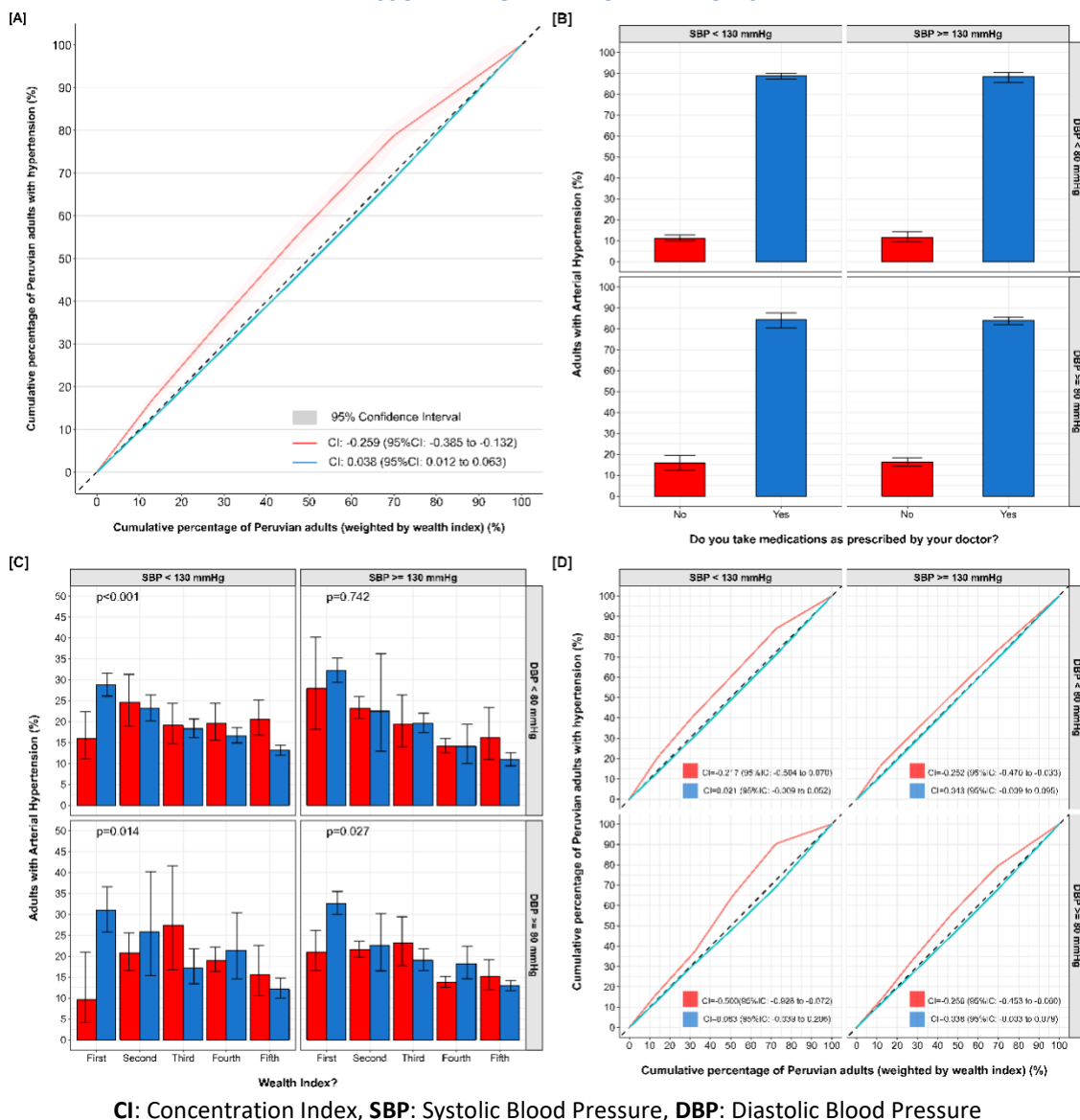
**TABLE 2. REGRESSION MODELS TO ESTIMATE THE PREVALENCE OF ADHERENCE TO MEDICATIONS ACCORDING TO SOCIODEMOGRAPHIC AND HEALTH CHARACTERISTICS AMONG HYPERTENSIVE ADULTS**

Variables	Crude Model			Adjusted Model		
	cPR	95%CI	P-value*	aPR	95%CI	P-value*
<b>Sex?</b>						
Male		REF			REF	
Female	1.170	0.987 to 1.386	0.07	0.985	0.96 to 1.011	0.258
<b>Age Group?</b>						
65 or more years		REF			REF	
50 to 64 years	1.532	1.252 to 1.874	<0.001	0.945	0.914 to 0.976	0.001
30 to 49 years	1.650	1.374 to 1.983	<0.001	0.931	0.897 to 0.968	<0.001
<b>Educational Level?</b>						
University		REF			REF	
High School	1.521	1.256 to 1.842	<0.001	0.956	0.927 to 0.986	0.004
Elementary	1.219	1.016 to 1.463	0.033	0.99	0.962 to 1.018	0.479
Without Education	1.327	1.058 to 1.665	0.014	0.98	0.939 to 1.022	0.338
<b>Wealth Index?</b>						
Q1 (richest)		REF			REF	
Q2	1.454	1.061 to 1.993	0.020	0.966	0.929 to 1.005	0.083
Q3	1.573	1.201 to 2.062	0.001	0.952	0.918 to 0.989	0.010
Q4	1.628	1.267 to 2.091	<0.001	0.937	0.901 to 0.974	0.001
Q5 (poorest)	1.834	1.417 to 2.374	<0.001	0.879	0.822 to 0.941	<0.001
<b>Area of Residence?</b>						
Urban		REF			REF	
Rural	1.106	0.954 to 1.282	0.180	1.056	1.007 to 1.108	0.025
<b>Place of Residence?</b>						
Other Regions		REF			REF	
Capital	0.808	0.669 to 0.975	0.027	1.006	0.977 to 1.037	0.682
<b>Health Insurance?</b>						
No		REF			REF	
Yes	0.81	0.655 to 1.002	0.053	1.022	0.982 to 1.063	0.288

**cPR:** crude Prevalence Ratio, **aPR:** Prevalence Ratio adjusted for the other variables, **95%CI:** Confidence interval at 95%, **REF:** Category used as reference for estimates.

\*P-value estimated by Poisson regression model with robust variance and weighting factor.

**FIGURE 1. SOCIOECONOMIC INEQUALITY IN ADHERENCE TO ANTIHYPERTENSIVE TREATMENT ACCORDING TO BLOOD PRESSURE RANGE IN PERUVIAN ADULTS**

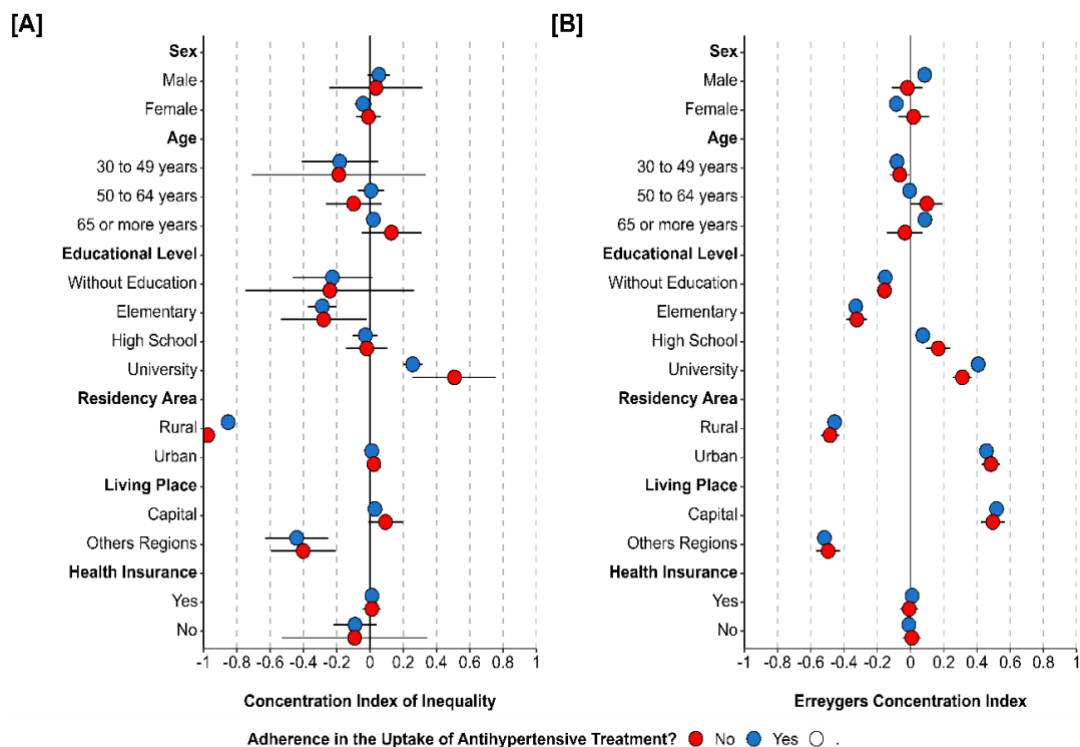


In evaluating inequality with the Erreygers Concentration Index (ECI), it was identified that among hypertensive adults with adherence to medication intake, women (ECI: -0.085; 95% CI: -0.118 to -0.052;  $p < 0.001$ ), those aged 30 to 49 years (ECI: -0.082; 95%CI: -0.103 to -0.061;  $p < 0.001$ ) and 65 or older (ECI: 0.087; 95% CI: 0.052 to 0.122;  $p < 0.001$ ), without education (ECI: -0.152; 95%CI: -0.171 to -0.133;  $p < 0.001$ ) or only elementary education (ECI: -0.329; 95%CI: -0.354 to -0.304;  $p < 0.001$ ), living in rural areas (ECI: -0.457; 95%CI: -0.483 to -0.431;  $p < 0.001$ ) or regions outside the

capital (ECI: -0.518; 95%CI: -0.549 to -0.486;  $p < 0.001$ ) exhibited greater inequality. In addition, among adults with high blood pressure who did not take their medicine as prescribed, those aged 30 to 49 (ECI: -0.064; 95%CI: -0.121 to -0.008;  $p = 0.012$ ), without education (ECI: -0.156; 95%CI: -0.201 to -0.112;  $p < 0.001$ ) or elementary education (ECI: -0.323; 95%CI: -0.386 to -0.260;  $p < 0.001$ ), living in rural areas (ECI: -0.484; 95%CI: -0.537 to -0.430;  $p < 0.001$ ), or outside the capital (ECI: -0.495; 95%CI: -0.569 to -0.422;  $p < 0.001$ ) showed greater inequality (Figure 2B).



FIGURE 2. SOCIOECONOMIC INEQUALITY IN ADHERENCE TO ANTIHYPERTENSIVE TREATMENT IN PERUVIAN ADULTS



In the assessment of blood pressure among hypertensive Peruvian adults, an average systolic blood pressure (SBP) of 143.34 mmHg (95%CI: 142.64 to 144.07) and an average diastolic blood pressure (DBP) of 77.81 mmHg (95% CI: 77.40 to 78.23) were identified. Additionally, among hypertensive Peruvian adults, only 26.40% (95%CI: 25.09 to 27.74) fell within the optimal range for SBP<130 mmHg and DBP<80 mmHg. Within this group, 88.81% (95%CI: 87.24 to 90.21) adhered to medication intake. Conversely, 36.92% (95%CI: 35.44 to 38.43) were outside the optimal blood pressure range (SBP $\geq$  130 mmHg/DBP  $\geq$  80 mmHg).

Within this group, only 83.86% (95%CI: 81.85 to 85.68) adhered to medication intake (Figure 1B). In addition, it was found that in both cases, the wealth quintile made a big difference in the number of adults with high blood pressure who took their medication as prescribed ( $p<0.050$ ) (Figure 1C). When inequality was examined, it was found that adults with high blood pressure who did not take their medicine as prescribed and whose blood pressure readings were outside the ideal range had more inequality.

This worsened as their readings moved away from the range of DBP $\geq$  80 mmHg and toward the ideal range of SBP< 130 mmHg (Figure 1D).

Across the 25 regions of Peru, although the frequency of hypertensive adults over 29 years of age was less than 20% (Figure 3A), adherence within this group was over 70% (Figure 3B). However, regions in the Peruvian jungle and highlands exhibited greater inequality in adherence to antihypertensive medication (Figure 3C). Additionally, during the evaluation period, a slight decrease in the proportion of hypertensive Peruvian adults over 29 years old was identified from 2013 (17.30%, 95%CI: 15.28 to 19.53) to 2023 (14.93%, 95%CI: 14.06 to 15.85). The proportion of those adhering to medication remained consistent above 80%, ranging from 83.40% (95%CI: 72.74 to 90.43) to 89.50% (95%CI: 87.26 to 91.46).

Furthermore, a growing gap has been observed in the number of hypertensive adults without adherence to medication intake in recent years (Figure 4A). On the other hand, when looking at the annual change in inequality among adults with high blood pressure who were taking their medications, it was found that the inequality indices worsened over time (Figure 4B).

FIGURE 3. DISTRIBUTION OF ADHERENCE TO ANTIHYPERTENSIVE TREATMENT IN PERUVIAN

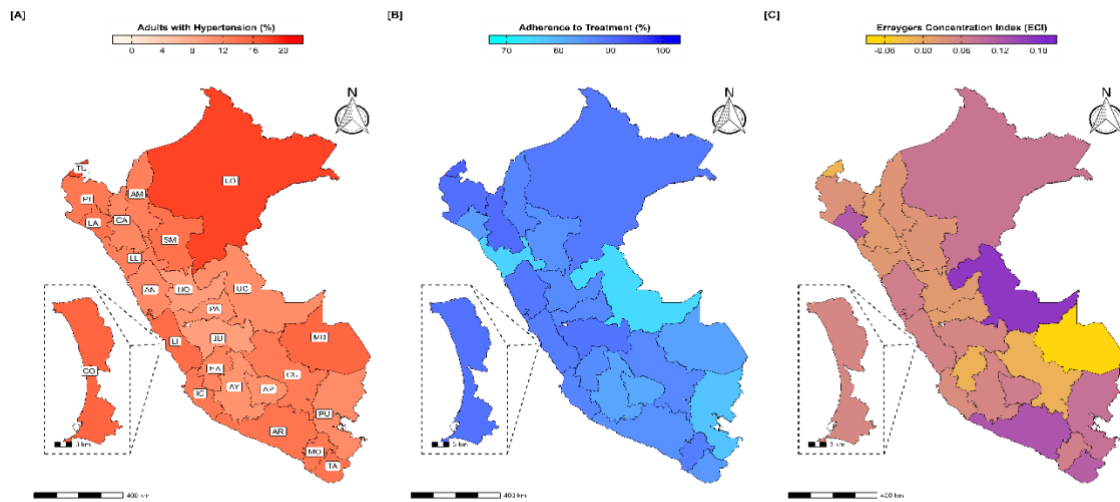
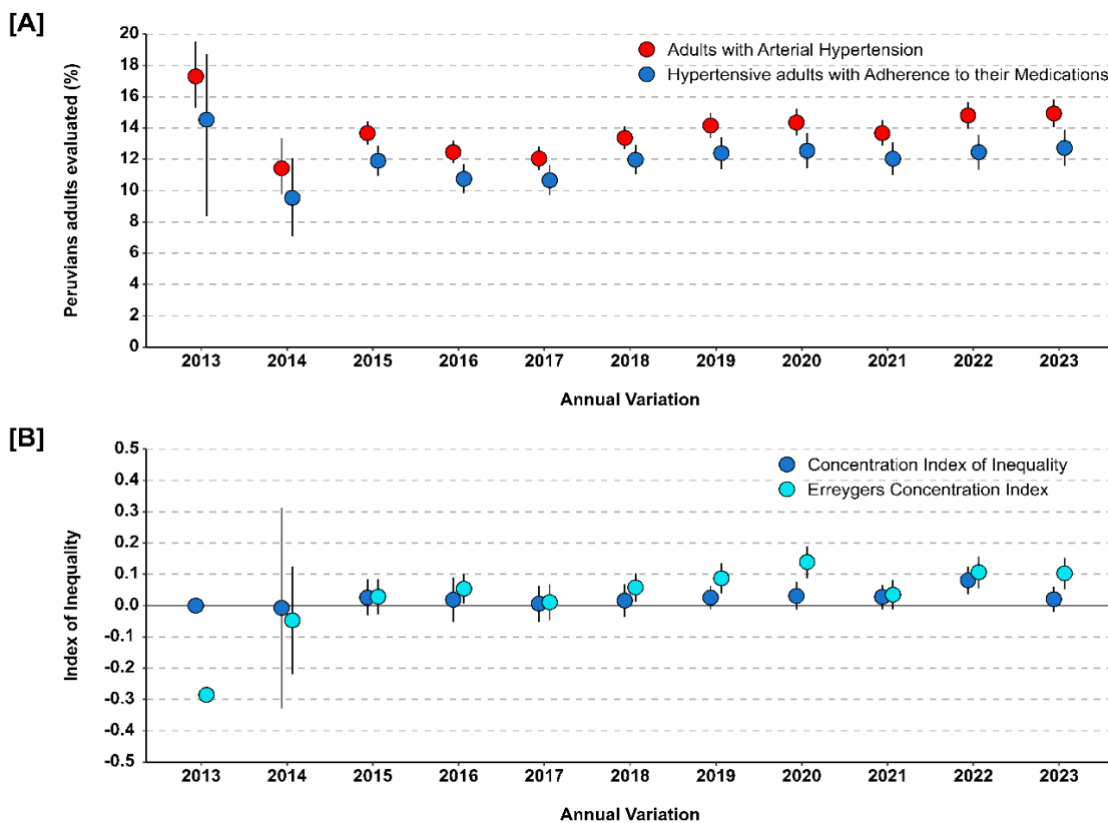


FIGURE 4. ANNUAL VARIATION OF INEQUALITY IN ADHERENCE TO ANTIHYPERTENSIVE TREATMENT IN PERU



## DISCUSSION

This study assessed sociodemographic inequalities in medication intake among adults with hypertension in Peru. It has been found that hypertensive adults in rural areas face greater disparities in their medication intake. This is because there are few healthcare centers

in rural areas and access to antihypertensive medications is limited. In Peru, only 36% of public health centers use these medications available (21). This worsens the situation for 23.1% of Peruvians without health insurance (22). This situation is similar to that in other Latin American nations, such as Brazil, where 10% of individuals with hypertension and



diabetes do not have access to necessary medications for their conditions (23,24).

In this context, community health initiatives such as home monitoring, lifestyle counseling, and follow-up calls have shown efficacy in improving treatment adherence and identifying access issues to medications (25,26). However, in Peru, telemedicine faces challenges in incorporating digital interventions due to the lack of Internet access, especially in rural areas, such as the jungle and highlands (27,28). As a result, interventions derived from this service for populations with chronic diseases are confined to urban areas (29). However, educational interventions targeting healthcare professionals and patients, combined with appointment reminders, have shown success (30,31).

Hypertensive adults with higher education levels experience less inequality in medication intake, highlighting the vital role of education in comprehending cardiometabolic diseases. This emphasizes the importance of education for understanding cardiometabolic diseases (32). Individuals with a university education are better equipped to understand the significance of maintaining regulated 'blood pressure levels' (33). Conversely, individuals with lower educational levels, particularly in populations with other languages and rural areas, face greater challenges in following therapeutic guidelines (34,35). This is evident in Peruvian hospitals, where up to 35% of hypertensive adults struggle to understand health information, leading to only 15% following treatment (36).

Among younger hypertensive Peruvian adults, lower inequality in medication adherence was observed, possibly due to the lower prevalence of formal employment in this age group (9,37). This may be because only one in four young adults in Peru has formal employment, which makes it difficult to integrate arterial hypertension treatment (9,38,39). Non-adherence to hypertension medication can lead to complications and an increased need for medication to control blood pressure (40,41). As the hypertensive population ages, they typically acquire greater knowledge about their condition and show increased adherence to treatment (33,42). Integrating newly diagnosed hypertensive adults into support groups with those who have lived with the disease for longer periods could help reduce disparities in adherence to antihypertensive medications (43).

The lower occurrence of hypertension in women may explain the variance in adherence to antihypertensive medication between men and women (44). However, it is important to consider that underreporting of

hypertension in women may distort the assessment of inconsistent adherence to antihypertensive treatment. However, evidence indicates that women are at a higher risk of developing hypertensive disorders in specific contexts such as pregnancy and menopause (45-47). In the Peruvian context, there is no clinical therapeutic approach tailored to these risks, which could lead to inadequate therapeutic regimens with insufficient antihypertensive medication, exacerbating adverse socioeconomic conditions (48-50).

Non-adherence in hypertensive patients with normal blood pressure may stem from forgetfulness, a lack of motivation to maintain normal values, the presence of other health conditions, and perceiving the disease as not severe (51,52). Psychosocial intervention models help emphasize the benefits of treatment and provide adherence skills, such as keeping medication in a visible place or taking it with breakfast (53). Additionally, setting shared goals between physicians and patients has been shown to improve adherence (54).

The focus of this study was to examine the differences in adherence to antihypertensive medication. However, this study has limitations due to the nature of the Demographic and Family Health Survey in Peru, which addresses hypertension or elevated blood pressure without delving into the context of diagnosis or assessment. Furthermore, the survey generally inquired whether adults took the medications prescribed by their doctors for hypertension or elevated blood pressure, without evaluating the reasons, difficulties, and complications that might prevent them from adhering to their treatment properly. Similarly, it does not explore the knowledge of hypertensive adults about their disease or the importance of taking antihypertensive medications.

In conclusion, among hypertensive Peruvian adults, there are socioeconomic inequalities in adherence to medication for their condition. These inequalities are more pronounced among adults living in rural areas or outside the capital, those with lower educational levels, or those belonging to a younger age group. This disparity has decreased in specific regions of Peru in the recent years. Identifying these sources of inequality helps pinpoint areas for enhancing antihypertensive treatment strategies in Peru, with the aim of providing more equitable care for adults with hypertension.

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## AUTHORS CONTRIBUTIONS

CIE was involved in the conception and design of the work, analysis and interpretation of data, drafting of

the manuscript, critical review of the manuscript, and approval of the final version. LAQG was involved in drafting the manuscript, critically reviewing the manuscript, and approving the final version.

## DATA AVAILABILITY

The data are available upon request from the corresponding author.

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