

## PREVALENCE AND CONTROL OF HYPERTENSION: COMPARISON BETWEEN URBAN AND RURAL POPULATION

### PREVALÊNCIA E CONTROLE DA HIPERTENSÃO ARTERIAL: ESTUDO COMPARATIVO ENTRE POPULAÇÃO URBANA E RURAL

### PREVALENCIA Y CONTROL DE LA HIPERTENSIÓN: UN ESTUDIO COMPARATIVO ENTRE LA POBLACIÓN URBANA Y LA POBLACIÓN RURAL

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## ABSTRACT

**Background:** Hypertension is considered a public health problem due to its high prevalence and control difficulties. **Objectives:** To estimate the prevalence of hypertension and evaluate the main characteristics associated with failure to control blood pressure comparing rural with the urban population. **Materials and Methods:** An epidemiological study of 1528 adult residents of the city of Sacramento/Minas Gerais/Brazil. Were collected during home visits, socioeconomic and behavioral variables, the following characteristics of drug treatment, difficulties in using the health and achievement of blood pressure measurement services. To analyze the association between the dependent variable (not blood pressure control) and other variables we used the chi-square test of Pearson and the Odds Ratio. The level of significance was set at  $\alpha = 0.05$ . **Results:** 153 subjects residing in rural areas and 1375 in urban area were interviewed. The prevalence of hypertension in the city was 38.6% and 38.6% in urban areas and 38.5 % in rural areas. Among hypertensive patients ( $n = 590$ ), 91.5% were aware of this condition; 90.6% were under treatment, and 52.6 % had controlled blood pressure. The variables that were associated with the non-control BP were: alcohol consumption ( $p = 0.001$ ), difficulty in following the prescriptions ( $p = 0.000$ ), failure to attend medical appointments ( $p = 0.005$ ). **Conclusions:** Hypertension proved to be highly prevalent and important public health as well in a small city from the countryside.

**Keywords:** Prevalence; Hypertension; Control; Urban Population; Rural Population.

## RESUMO

**Objetivo:** estimar a prevalência, conhecimento e tratamento da hipertensão arterial sistêmica, comparando as características associadas ao não controle da pressão arterial entre população hipertensa urbana e rural de um município de pequeno porte do interior de Minas Gerais. **Material e métodos:** estudo epidemiológico com 1.528 residentes do município de Sacramento-MG, Brasil. Foram coletadas variáveis socioeconômicas e comportamentais, dificuldades de utilização dos serviços de saúde e realização da medida da pressão arterial. Para analisar a associação entre a variável dependente (não controle da pressão arterial) e demais variáveis, utilizou-se o teste qui-quadrado de Pearson e calculou-se a Odds Ratio. O nível de significância adotado foi de  $\alpha = 0.05$ . **Resultados:** foram entrevistados 153 sujeitos residentes da área rural e 1.375 da área urbana. A prevalência da hipertensão foi de 38,6%, sendo 38,6% na área urbana e 38,5% na área rural. Entre os hipertensos ( $n=590$ ), 91,5% sabiam dessa condição; 90,6% estavam em tratamento e 52,6% apresentaram a pressão arterial controlada. Tinham associação com o não controle da pressão arterial: consumo de bebida alcoólica ( $p=0,001$ ), dificuldade de seguir a prescrição medicamentosa ( $p=0,000$ ), não comparecimento às consultas médicas de rotina ( $p=0,005$ ). **Conclusões:** a hipertensão arterial revelou-se de alta prevalência e importante problema de saúde pública também em um município de pequeno porte do interior do país.

**Palavras-chave:** Prevalência; Hipertensão; Controle; População Urbana; População Rural.

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## RESUMEN

**Objetivo:** Estimar la prevalencia, el conocimiento y el tratamiento de la hipertensión arterial sistémica, comparando las características asociadas con ningún control de la presión arterial entre la población urbana y rural de una pequeña ciudad del interior de Minas Gerais. **Material y método:** Estudio epidemiológico con 1.528 habitantes de la ciudad de Sacramento / Brasil. Se recogieron variables socioeconómicas y de comportamiento, dificultades para usar los servicios de salud y si hubo control de la presión arterial. Para analizar la asociación entre la variable dependiente (Ningún control de la presión arterial) y las demás variables se utilizó la prueba Chi cuadrado de Pearson y se calculó el cociente de probabilidades. El nivel de significación se fijó en  $\alpha = 0,05$  **Resultados:** Se entrevistó a 153 habitantes de la zona rural y a 1.375 de la zona urbana. La prevalencia de hipertensión fue de 38,6%: 38,6% en la zona urbana y 38,5% en la rural. Entre los pacientes hipertensos ( $n = 590$ ), el 91,5% era consciente de su estado; un 90,6% estaba en tratamiento y un 52,6% había controlado la presión arterial. El consumo de bebidas alcohólicas ( $p = 0,001$ ), la dificultad para seguir con los medicamentos recetados ( $p = 0,000$ ), el faltar a las citas médicas de rutina ( $p = 0,005$ ) están asociados con ningún control de la presión arterial. **Conclusiones:** La hipertensión arterial ha demostrado ser de alta prevalencia y un problema de salud pública grave también para una pequeña ciudad del interior del país.

**Palabras clave:** Prevalencia; Hipertensión; Control; Población Urbana; Población Rural.

## INTRODUCTION

Systemic arterial hypertension (SAH) is considered a public health problem due to its high prevalence and difficult to control, and it is one of the most important risk factors for cardiovascular diseases.<sup>1</sup>

Considering BP values  $\geq 140/90$  mmHg, 22 studies found prevalence between 22.3 and 43.9%, mean of 32.5% in Brazil, with more than 50% between 60 and 69 years old and 75% above 70 years old.<sup>2,3</sup>

Blood pressure control is essential for the prevention of organ damage induced by arterial hypertension, but the asymptomatic nature of this disease causes to be underdiagnosed and then untreated, despite its high prevalence.<sup>4</sup>

Studies conducted in Brazil emphasize high prevalence and low rates of knowledge and control of arterial hypertension.<sup>5-7</sup> A survey conducted in a small city in the interior of the country, with 1,003 individuals aged 18 to 90 years old, had a prevalence of SAH of 30.1%. Among the hypertensive patients in this study ( $N = 302$ ), 73.5% knew about this condition, 61.9% were receiving treatment, and 24.2% had controlled BP.<sup>3</sup>

In Minas Gerais, few studies have been carried out, and the risk profile of the residents of small demographic municipalities is not known<sup>8</sup>. In the city of Sacramento, according to data recorded in the Basic Attention Information System<sup>9</sup>, the Municipal Health Department works with a prevalence of SAH of 17.9% in the city, 19.4% in the rural area and 17.7% in the urban area. The scarcity of studies on the prevalence of hypertension in these municipalities indicates the usefulness of this information for directing preventive, therapeutic and care projects and actions, as well as for populations with similar characteristics.<sup>10</sup>

Being a resident of urban or rural areas may involve cultural differences and important lifestyles that can directly influence the risk factors of chronic diseases, especially arterial hypertension, as well as their treatment and control.

A study of 142,042 people between 35 and 70 years old of 628 urban and rural communities in three high-income coun-

tries, seven high-middle income (including Brazil), three low-middle income and four low-income communities found SAH index of 40.1% in urban areas and 39.2% in rural areas. Knowledge levels of hypertensive condition and treatment were similar between urban and rural areas in high and middle-high-income countries, but they were significantly lower in rural areas of low-income countries. The BP control index was consistently lower in rural areas than in urban areas in all countries.<sup>11</sup>

In Brazil, a study of 251 individuals in the rural area of the state of Minas Gerais to determine the prevalence of the metabolic syndrome among the participants older than 18 years old, found a prevalence of hypertension (62.5%), being higher in men (65.8%) than in women (59.7%).

Given this problem, this study aims to estimate the prevalence, knowledge, and treatment of hypertension, comparing the characteristics associated with the non-control of blood pressure among urban and rural hypertensive population of a small municipality in the interior of Minas Gerais.

## MATERIAL AND METHODS

The study was carried out in the city of Sacramento, located in the Triângulo Mineiro, Alto Paranaíba region in the state of Minas Gerais. The city has 23,880 inhabitants,<sup>13</sup> with 19,278 residents in the urban area and 4,602 in the rural area. According to data from the local Municipal Health Department, there are 14,217 people aged 20 years old or more, 12,974 of them in the urban area and 1,243 in the rural area. The city has a population coverage of 85.9% of the Family Health Strategy (ESF), composed of five teams in the urban area (19 neighborhoods) and one in the rural area (six villages).

This is a population-based study, with a random sampling of a quantitative, transverse, descriptive and exploratory approach. A total of 1528 residents (153 rural and 1375 urban), aged 20 years old or older, who reported having SAH, participated. Exclusion criteria were: pregnancy, severe psychiatric illness or mental incapacity attested by a health report.

The sample size was determined based on the estimate of the population proportion, using a prevalence of SAH of 44%, a maximum value according to studies conducted in Brazil.<sup>1</sup> The total sample size was estimated in 1,705 individuals selected from a random sample of 14,217 inhabitants of 5,939 households, with correction for finite population and refusal adjustment of 20%, respecting the population density of the various urban and rural areas. Confidence level was set at 95% and design error of 2.5%. For each area covered by the ESF, a distributed sample was estimated as follows: 205 individuals for the area I; 341 for II; 358 for III; 324 of each of the areas IV and V; and 153 for area VI. This VI area is rural and subdivided into six villages distant from each other and the city, being 42 km closest to the city and 82 km furthest to the city.

## PROCEDURE AND DATA COLLECTION

The sample was drawn in four stages. The sample units of the first stage were by areas of ESF coverage of the urban and rural zone of the city. The second stage was sampling by streets, the third stage by households and the fourth stage by choice of a resident. For the selection of individuals, the first birthday was chosen from the interview date.

The choice of participants in the rural area was obtained by drawing randomly from the numerical record of the families in the Family Health Strategy, according to the population corresponding to the area covered by the Basic Health Information System (SIAB) of the Municipal Health Department. The same criterion of the urban population was used for the selection of the participants.

Preliminarily, subjects were informed about the research objectives and procedures and then invited to participate in the study voluntarily. Data were collected after signing the Informed Consent Term (TCLE). This study was approved by the Ethics and Research Committee of the University of São Paulo at Ribeirão Preto College of Nursing (EERP-USP) under protocol n° 188/2012. It should be noted that this work has no conflicts of interest.

The data collection was performed through an interview between January 2013 and January 2014, using a semi-structured instrument addressing socio-demographic and economic variables, lifestyle, anthropometric data, knowledge of hypertensive status, medications in use, access to health services and reasons why they seek care.

The criterion for the classification of SAH will be blood pressure (BP)  $\geq$  140/90 mmHg or current antihypertensive use.<sup>14</sup>

Individuals who reported not knowing the condition of their blood pressure, who were not taking antihypertensive drugs and who had BP of 140/90 mmHg or more were referred to the health service for diagnostic confirmation or not of hypertension, with previously scheduled medical appointments, which in the case occurred in the Family Health Strategy (FHS)

unit in which the individuals were registered. The health services have received a list of all the individuals in these conditions, and may even perform an active search for them in the case of non-attendance. After the date of the consultation, the researcher sought the health service to obtain information regarding the evaluation of the individuals referred. The subjects who received the diagnosis of hypertension were classified as individuals who were unaware of their hypertensive condition.

The dependent variable was "no BP control" among individuals who knew their hypertensive condition and with pressure values equal or greater than 140/90 mmHg on the day of the interview.

The independent variables of interest were: gender; age group; years of study; family situation; religion; sedentary lifestyle (not physical activity at least three times a week for at least 30 minutes a day); smoking (consumption of at least one cigarette/day); Alcohol consumption (consuming more than 30 g ethanol/day for men and 15 g/day for women); time for the diagnosis of hypertension; difficulty accessing the health service; type of health service used (agreement/private or SUS); medical appointment in the last year; reasons why they are looking for the health service; associated diseases; amount of antihypertensive tablets prescribed per day; source of the antihypertensive drug (SUS or needed to buy); routine medical consultation at least once a year; frequency of BP assessment annually; and adherence to drug treatment according to the "Drug Adherence Questionnaire – Qualiads" (QAM-Q).<sup>16</sup>

The criteria for calculating the BP control index considered were values found below 140 x 90 mmHg among participants who knew their condition and were undergoing treatment.

## DATA STATISTICAL ANALYSIS

The Odds Ratio (OR) was calculated with its respective 95% confidence intervals for each study variable to analyze the association between the dependent variable (non-BP control) and socio-demographic and economic variables; Clinics/treatment/lifestyle and access to health services. The level of significance was  $\alpha=0.05$ . The SPSS Windows Statistical Package for Social Science (SPSS), version 17.0 was used.

## RESULTS

There were 10.38% of the refusal of the total of the calculated sample (1,705), all in the urban area, resulting in a total of 1,528 subjects. A total of 153 subjects from the rural area and 1,375 from the urban area were interviewed. The prevalence of SAH was 38.6%, the same proportion in the urban area (38.6%) and the rural area (38.5%). The index of control was very close between them, being 51.1% of the urban population and 52.8% of the rural population.

In the 131 individuals referred to the health service for the diagnostic confirmation of SAH who presented BP  $\geq 140 \times 90$  mmHg on the day of the interview and who reported not knowing their hypertensive condition, 50 (38.1%) were diagnosed with SAH, 53 (40.5%) had negative diagnoses for SAH and 28 (21.4%) were not evaluated by the health service, by change of address, refusal of the individuals or by not being in the residence at the time of the visit by the ESF team.

In hypertensive patients; 91.5% knew their condition; 90.6% were undergoing treatment, and 52.6% presented controlled BP. Figure 1 shows the distribution of total sample according to prevalence, knowledge, treatment and control of BP.

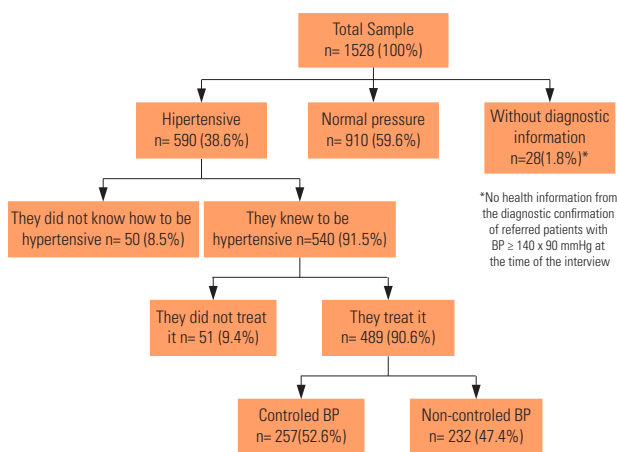


Figure 1 - Distributions of individuals (n=1528) according to prevalence, knowledge, treatment and control of SAH, Sacramento (MG), Brazil, 2013.

The predominant socio-demographic characteristics in the sample (1,528) were: female gender (69.7%); age up to 39 years old (31.2%); white skin color (79.0%); less than four years of study (43.6%); workers in general services/commerce (86.1%); economy class C (52.2%); and earnings less than one minimum wage per person (58.2%).

In the hypertensive patients, the predominant socio-demographic characteristics were the same as those of the total sample, except for the age group, predominating those 60 years old or older (59.5%).

Table 1 shows the association between the non-control of BP and socio-demographic, economic, behavioral variables, characteristics of the follow-up of the drug treatment and access to the health service of hypertensive subjects who knew their condition. Table 2 shows the univariate analysis of the association of non-control of BP and characteristics of the follow-up of the drug treatment and access to health services among the subjects who knew their hypertensive condition.

## DISCUSSION

The prevalence found in this study (38.6%) is within the range of other studies carried out in Brazil<sup>1</sup>, but well above the values provided by the Municipal Health Secretary of Sacramento.<sup>9</sup> This can demonstrate that data not updated in the SIAB, failures in the diagnosis and monitoring of families by the Family Health Strategy teams. Values also above 30% were found in different regions of Brazil: Nobre-MT (30.1%)<sup>3</sup>, Formiga-MG (32.7%)<sup>8</sup> and Florianópolis-SC (40.1%).<sup>17</sup>

Table 1 - Univariate analysis of the association of non-control of blood pressure and socio-demographic, economic and behavioral variables in individuals who knew their hypertensive condition (n=540). Sacramento, MG, Brazil, 2013

Variables of the study	Rural (n= 53)	Urban (n= 487)	Total Population (n=540)	OR	CI 95%	p-value
	Non- Control (%)	Non-Control (%)	Non-Control (%)			
<b>Gender</b>						
Female	43.3	46.7	46.4	1	(0.93-1.95)	0.107
Male	52.2	54.3	54.0	1.35		
<b>Age group (years old)</b>						
Up to 59 years old	46.9	45.7	45.9	1	(0.85-1.70)	0.279
≥ 60 years old	47.6	50.8	50.6	1.21		
<b>Family Situation</b>						
Not living alone	47.8	48.2	48.1	1	(0.72-1.84)	0.539
Livign alone	42.9	52.6	51.8	1.15		
<b>Religion</b>						
Yes	49.0	49.3	49.3	1	(0.39-1.39)	0.350
No	25.0	43.6	41.9	0.74		

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Table 1 - Univariate analysis of the association of non-control of blood pressure and socio-demographic, economic and behavioral variables in individuals who knew their hypertensive condition (n=540). Sacramento, MG, Brazil. 2013

Variables of the study	Rural (n= 53)	Urban (n= 487)	Total Population (n=540)	OR	CI 95%	p-value
	Non- Control (%)	Non-Control (%)	Non-Control (%)			
<b>Years of study</b>						
≥ 8 years of study	50.0	47.7	47.8	1	(0.71-1.54)	0.811
< 8 years old study	46.7	49.3	49.0	1.04		
<b>Economy class</b>						
A/B	28.6	49.6	48.5	1	(0.68-1.49)	0.954
C/D/E	50.0	48.6	48.8	1.01		
<b>Smoking</b>						
No	48.9	47.4	47.6	1	(0.83-2.07)	0.233
Yes	37.5	56.1	54.4	1.31		
<b>Alcohol</b>						
No	44.7	46.8	46.6	1	(1.32-4.43)	0.003
Yes	66.7	68.1	67.9	2.42		
<b>Sedentarism</b>						
No	45.5	48.6	48.3	1	(0.67-153)	0.922
Yes	47.6	48.9	48.8	1.02		

CI: confidence interval; OR: Odds Ratio.

Source: own elaboration.

Table 2 - Univariate analysis of the association of non-control of blood pressure and characteristics of the follow-up of drug treatment and access to the health service in the participants who knew their hypertensive condition. Sacramento, MG, Brazil. 2013

Variables of the study	Rural (n= 53)	Urban (n= 487)	Total Population (n=540)	OR	CI 95%	p-value
	Non-Control (%)	Non-Control (%)	Non-Control (%)			
<b>Time of diagnosis</b>						
Up to 3 years	45.5	42.9	42.2	1	(0.94-2.10)	0.092
More than 3 years	48.8	50.7	50.7	1.41		
<b>Tablets/day</b>						
Mor than 2	51.8	46.2	46.8	1	(0.76-1.52)	0.674
1 to 2	40.0	49.6	48.7	1.07		
<b>Adherence to treatment</b>						
Yes	17.4	28.6	27.5	1	(3.16-6.67)	0.000
No	70.0	62.8	63.5	4.59		
<b>Type of Service</b>						
Insurance/Particular	0.0	47.5	47.1	1	(0.70-1.67)	0.712
SUS	48.1	49.2	49.1	1.08		
<b>Difficulty of access</b>						
No	40.6	50.7	49.9	1	(0.59-1.24)	0.420
Yes	57.1	44.5	46.1	0.86		
<b>Frequency of BP measurement</b>						
>1times/year	45.1	48.4	48.0	1	(0.74-2.23)	0.365
≤ 1 times/year	100.0	52.7	54.4	1.29		

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Table 2 - Univariate analysis of the association of non-control of blood pressure and characteristics of the follow-up of drug treatment and access to the health service in the participants who knew their hypertensive condition. Sacramento, MG, Brazil. 2013

Variables of the study	Rural (n= 53)	Urban (n= 487)	Total Population (n=540)	OR	CI 95%	p-value
	Non-Control (%)	Non-Control (%)	Non-Control (%)			
Routine consultation						
Yes	39.4	44.4	43.9	1	(1.27-2.67)	0.001
No	60.0	59.1	59.2	1.84		

CI: confidence interval; OR: Odds Ratio.  
Source: own elaboration.

The fact that the prevalence of SAH was equal between urban and rural areas and the rates of BP control are very similar between them can be explained by the changes in lifestyle and behavioral factors that have been occurring among rural dwellers in the last decades. The evolution of technology and wage labor contribute to the increase in sedentarism, consumption of processed foods, higher amounts of salt, overweight and obesity, also reaching the rural population.<sup>16</sup> Therefore, these factors are proven to be associated with cardiovascular diseases and, especially to arterial hypertension and its control.<sup>1</sup>

The 52.6% BP index among the hypertensive residents of the city of Sacramento was superior to several studies conducted in Brazil: Nobre-MT (24.2%)<sup>3</sup>, São Paulo-SP (35.2%)<sup>5</sup>, Tubarão-SC (10.1%)<sup>7</sup>, state of Rio Grande do Sul (10.4%)<sup>19</sup> and São José do Rio Preto-SP (52.4%).<sup>2</sup> This relevant result may be associated with the ease of access to health services and medicines, as well as to the good socioeconomic development of the municipality, presenting the Municipal Human Development Index (IDH-M) of 0.732 in 2010, appearing in the list of 100 municipalities with the highest HDI-M among the cities of Minas Gerais in the same year.<sup>20</sup> However, some authors estimate that blood pressure control rates in Brazil should be overestimated, mainly due to the heterogeneity of the work performed.<sup>21</sup>

Some studies show that countries with large numbers of inhabitants in rural areas show unacceptably low rates of knowledge, treatment, and control. In Nigeria with 2,678 study participants, the prevalence of HBP was 19.3%, and 92% were unaware of their hypertension status, 2% were on treatment and only 3% with controlled BP. Also, alarming rates were found in Kenya among 2,111 participants, whose prevalence of SAH was 21.4%; 83% were unaware of their hypertensive condition; 9% were on treatment, and only 2.6% had BP controlled.<sup>22</sup>

This study also demonstrated that the consumption of alcoholic beverage above the recommended standards, not adherence to drug treatment, and not to perform routine consultations were variables with a statistically significant association with non-control of BP. Non-attendance at routine visits (at

least once a year) increased the risk of uncontrolled BP by 1.8 times. However, there is controversy regarding the importance of adherence frequency and blood pressure control.

A randomized, retrospective study<sup>23</sup> of 245 hypertensive patients with the objective of relating attendance to medical consultations to blood pressure control was found to be a positive association, but with lower rates of control of hypertension among the patients (30%) compared to this study (56.1%). The difference was even greater among the patients who attended medical consultations, 8% of control in the work of Coelho et al.<sup>21</sup> versus 40.8% in this study. Another study<sup>24</sup> also demonstrated the existence of the association between frequency of medical visits and adherence.

However, other authors<sup>25,26</sup> showed that higher frequency of consultations had no impact on adherence to treatment or clinical control. Some suggest that these controversial results may indicate a limitation of the study variable because the quality of the consultations is more important than the frequency.<sup>26</sup>

Regarding the alcohol consumption, this seems to be associated with non-control of blood pressure. In our study, patients who consumed alcohol presented a risk of not controlling their BP, 2.4 times higher than those who did not ingest alcohol. This can be explained by the fear of undesirable effects of mixing antihypertensive drugs with alcohol. The fear of mixing medication and alcoholic beverage was one of the main responses reported in a cross-sectional study with 401 patients in different centers in the state of Bahia, who analyzed the reasons that led patients to not adhering to treatment for hypertension.<sup>27</sup>

Regarding the limitations of this study, it should be emphasized that even using BP measurement equipment calibrated and recommended in scientific research, the values obtained for selection and definition between people with controlled and uncontrolled BP may be influenced by several physical and emotional factors at the time of BP measurement. Another limitation of the study is that most of the information obtained was self-reported, which can lead to errors resulting from the respondent's understanding, mistakes related to the respondent's memory and other distortions, interfering with some results.

## CONCLUSIONS

SAH in the city of Sacramento had a high prevalence. Although better compared to those observed in other studies, the levels of control and treatment of hypertension in this population are still considered unsatisfactory. The similarity of data on BP control between the urban and rural areas indicates that the rural population does not have difficulty accessing services and medicines or this difficulty is not a limiting factor for the control.

Knowledge of the risk factors associated with blood pressure control in this population may contribute to more resolute actions of health services and public policy planning aimed at achieving a better adherence to the treatment of arterial hypertension, with a consequent reduction in morbidity and mortality due to cardiovascular diseases.

## REFERENCES

- Sociedade Brasileira de Cardiologia. Sociedade Brasileira de Hipertensão. Sociedade Brasileira de Nefrologia. VI Diretrizes Brasileiras de Hipertensão Arterial. *Rev Bras Hipertens*. 2010[cited 2016 Aug 20];13: 260-312. Available from: [http://publicacoes.cardiol.br/consenso/2010/Diretriz\\_hipertensao\\_associados.pdf](http://publicacoes.cardiol.br/consenso/2010/Diretriz_hipertensao_associados.pdf)
- Cesarino CB, Cipullo JP, Martin JFV, Ciorlia LA, Godoy MRP, Cordeiro JA, et al. Prevalência e fatores sociodemográficos em hipertensos de São José do Rio Preto – SP. *Arq Bras Cardiol*. 2008[cited 2016 Aug 20];91(1):31-5. Available from: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0066-782X2008001300005](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0066-782X2008001300005)
- Rosário TM, Scala LCN, França GVA, Pereira MRG, Jardim PCV. Prevalência, controle e tratamento da hipertensão arterial sistêmica em Nobres – MT. *Arq Bras Cardiol*. 2009[cited 2016 Aug 20];93(6):672-8. Available from: <http://www.scielo.br/pdf/abc/v93n6/18.pdf>
- Cipullo JP, Martin JFV, Ciorlia LAS, Godoy MRP, Cação JC, Loureiro AAC, et al. Hypertension prevalence and risk factors in a Brazilian urban population. *Arq Bras Cardiol*. 2010[cited 2016 Aug 20];94:519-26. Available from: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0066-782X2010000400014](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0066-782X2010000400014)
- Mion Júnior D, Pierin AMG, Bensenor IM, Marin JCM, Costa KRA, Henrique LFO, et al. Hipertensão arterial na cidade de São Paulo: prevalência referida por contato telefônico. *Arq Bras Cardiol*. 2010[cited 2016 Aug 20];95: 99-106. Available from: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0066-782X2010001100015](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0066-782X2010001100015)
- Barbosa JB, Silva AAM, Santos AM, Monteiro Júnior FC, Barbosa MM, Barbosa MM, et al. Prevalência da hipertensão arterial em adultos e fatores associados em São Luís – MA. *Arq Bras Cardiol*. 2008[cited 2016 Aug 20];91: 260-6. Available from: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0066-782X2008001600009](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0066-782X2008001600009)
- Pereira MR, Coutinho MSSA, Freitas PF, D'Orsi E, Bernardi A, Hass R. Prevalência, conhecimento, tratamento e controle de hipertensão arterial sistêmica na população adulta urbana de Tubarão, Santa Catarina, Brasil, em 2003. *Cad Saúde Pública*. 2007[cited 2016 Aug 20];23: 2363-74. Available from: [http://www.scielo.br/scielo.php?pid=S0102-311X2007001000011&script=sci\\_abstract&tlng=es](http://www.scielo.br/scielo.php?pid=S0102-311X2007001000011&script=sci_abstract&tlng=es)
- Castro RAA, Moncau JEC, Marcopito LF. Prevalência de hipertensão arterial sistêmica na cidade de Formiga, MG. *Arq Bras Cardiol*. 2007[cited 2016 Aug 20];88:334-9. Available from: [http://www.scielo.br/scielo.php?pid=S0066-782X2007000300013&script=sci\\_abstract&tlng=pt](http://www.scielo.br/scielo.php?pid=S0066-782X2007000300013&script=sci_abstract&tlng=pt)
- Ministério da Saúde (BR). Sistema de Informação da Atenção Básica. Atenção básica e saúde da Família: números. Brasília: MS; 2008. [cited 25 Feb 2014]. Available from: <http://dab.saude.gov.br/atencaobasica.php>
- Lessa I, Mendonça GA, Teixeira MT. Doenças crônicas não-transmissíveis no Brasil: dos fatores de risco ao impacto social. *Bol Oficina Sanit Panam*. 1996[cited 2016 Aug 20];120: 89-413. Available from: [http://www.scielo.br/scielo.php?script=sci\\_nlinks&ref=000118&pid=S1517-8692200500040000800028&lng=pt](http://www.scielo.br/scielo.php?script=sci_nlinks&ref=000118&pid=S1517-8692200500040000800028&lng=pt)
- Chow CK, Teo KK, Rangarajan S, Islam S, Gupta R, Vezum A, et al. Prevalence, awareness, treatment, and control of hypertension in rural and urban communities in high-, middle-, and low-income countries. *JAMA*. 2013[cited 2016 Aug 20];310(9):959-68. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/24002282>
- Velásquez-Meléndez G, Gazzinelli A, Côrrea-Oliveira R, Pimenta AM, Kac G. Prevalence of metabolic syndrome in a rural area of Brazil. *Sao Paulo Med J*. 2007[cited 2016 Aug 20];125(3):155-62. Available from: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S1516-31802007000300006](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1516-31802007000300006)
- Instituto Brasileiro de Geografia e Estatística. Cidades. 2014.[cited 2014 May 14]. Available from: <http://www.cidades.ibge.gov.br/xtras/perfil.php?lang=&codmun=315690&search=minasgerais|sacramento>
- American Heart Association. Heart Disease and Stroke Statistics - Update. A report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. 2008. [cited 2014 May 05]. Available from: [www.circ.ahajournals.org](http://www.circ.ahajournals.org)
- Associação Brasileira de Empresas de Pesquisa. Dados com base no levantamento sócio econômico 2008 – IBOPE. 2010[cited 2014 May 05]. Available from: [www.abep.org](http://www.abep.org)
- Santa Helena ET, Nemes MIB, Eluf Neto J. Desenvolvimento e validação de questionário multidimensional para medir não-adesão ao tratamento com medicamentos. *Rev Saúde Pública*. 2008[cited 2016 Aug 20];42(2):764-7. Available from: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0034-89102008000400025](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-89102008000400025)
- Santos SDA, Petroski EL, Peres MA. Pré-hipertensão e hipertensão em adultos de Florianópolis: estudo de base populacional. *Rev Saúde Pública*. 2012[cited 2016 Aug 20];46(6):988-98. Available from: [http://www.scielo.br/scielo.php?pid=S0034-89102012000600008&script=sci\\_abstract&tlng=pt](http://www.scielo.br/scielo.php?pid=S0034-89102012000600008&script=sci_abstract&tlng=pt)
- Carvalho EO, Rocha EF. Consumo alimentar de população adulta residente em área rural da cidade de Ibatiba (ES, Brasil). *Ciênc Saúde Coletiva*. 2011[cited 2016 Aug 20];16(1):179-85. Available from: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S1413-81232011000100021](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-81232011000100021)
- Gus I, Harzheim E, Zaslavsky C, Medina C, Gus M. Prevalência, reconhecimento e controle da hipertensão arterial sistêmica no estado do Rio Grande do Sul. *Arq Bras Cardiol*. 2004[cited 2016 Aug 20];83(5):424-8. Available from: <http://www.arquivosonline.com.br/2004/8305/83050009.pdf>
- Organização das Nações Unidas. Índice de Desenvolvimento Humano – Municipal. Programa das Nações Unidas para o Desenvolvimento. 2010[cited 2014 May 05]. Available from: <http://www.atlasbrasil.org.br/2013/consulta>
- Nobre F, Mion Junior D. Adesão ao tratamento: o grande desafio das doenças crônicas e da hipertensão arterial. São Paulo: Leitura Médica; 2013. p.19.
- Hendriks ME, Wit FWNM, Roos MTL, Brewster LM, Akande TM, de Beer IH, et al. Hypertension in Sub-Saharan Africa: cross-sectional surveys in four rural and urban communities. *PLoS ONE*. 2012[cited 2016 Aug 20];7(3):1-10. Available from: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0032638>
- Coelho EB, Neto M, Palhares R, Cardoso MCM, Geleiete TJM, Nobre F. Relationship between regular attendance to ambulatory appointments and blood pressure control among hypertensive patients. *Arq Bras Cardiol*. 2005[cited 2016 Aug 20];85(3):157-61. Available from: [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S0066-782X2005001600002](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0066-782X2005001600002)
- Caro JJ, Salas M, Speckman JL, Raggio G, Jackson JD. Persistence with treatment for hypertension in actual practice. *CMAJ*. 1999[cited 2016 Aug 20];160:31-7. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1229943/>

25. Chapman RH, Benner JJ, Petrilla AA, Tierce JC, Collins SR, Battleman DS, *et al.* Predictors of adherence with antihypertensive and lipid-lowering therapy. *Arch Intern Med.* 2005[cited 2016 Aug 20];165:1147-52. Available from: <http://jamanetwork.com/journals/jamainternalmedicine/fullarticle/486562>
  26. Strelec MAAM, Pierin AMG, Mion Junior D. The influence of Patient's consciousness regarding high blood Pressure and Patient's attitude in face of disease controlling medicine intake. *Arq Bras Cardiol.* 2003[cited 2016 Aug 20];81(4):349-54. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/14666277>
  27. Andrade JP, Vilas-Boas F, Chagas H, Andrade M. Epidemiological aspects of adherence to the treatment of hypertension. *Arq Bras Cardiol.* 2002[cited 2016 Aug 20];79(4):375-84. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/12426646>
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