Acta Scientiarum. Health Sciences
ISSN: 1679-9291
ISSN: 1807-8648
actahealth@uem.br
Universidade Estadual de Maringá
Brasil

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Acta Scientiarum. Health Sciences, vol. 40, 2018, January-December 2019
Universidade Estadual de Maringá
Brasil

DOI: https://doi.org/10.4025/actascihealthsci.v40i1.34781

Available in: https://www.redalyc.org/articulo.oa?id=307259135011

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Acta Scientiarum

http://periodicos.uem.br/ojs/acta
ISSN on-line: 1807-8648
Doi: 10.4025/actascihealthsci.v40i1.34781

SAÚDE COLETIVA / PUBLIC HEALTH

Prevalence of self-reported *diabetes* and hypertension among users of primary health care services

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ABSTRACT. The objective of this cross-sectional study was to estimate the prevalence of self-reported hypertension and *diabetes* among the users of primary health care services of Southeast Ribeirão Preto, State of São Paulo, Brazil, and to identify variables which may be associated with these chronic conditions. A stratified sample of 1,055 adult individuals was surveyed, with the resulting associations being examined by using log-binomial regression models and then expressed as prevalence ratios (PRs). The prevalence of self-reported hypertension among women was 20.2% (95%CI: 17.5-23.1) and among men was 29.0% (95%CI: 22.9-35.5), while the prevalence of self-reported *diabetes* among women was 6.9% (95%CI: 5.2-8.8) and among men was 12.2% (95% CI: 8.1-17.3). The prevalence of both conditions increases significantly with age. Crude and adjusted PRs indicate no association between socioeconomic status and the self-reported chronic conditions.

Keywords: multiple chronic conditions, health services, cross-sectional studies.

Prevalência de *diabetes* e hipertensão arterial autorreferidas entre usuários de serviços de atenção primária de saúde

RESUMO. O objetivo deste estudo transversal foi estimar a prevalência de hipertensão e *diabetes* autorreferidas entre os usuários dos serviços de atenção primária à saúde de Ribeirão Preto, sudoeste do Brasil, e identificar variáveis que possam estar associadas a estas condições crônicas. Uma amostra estratificada de 1.055 adultos foi utilizada. Associações foram examinadas por modelos de regressão log-binomial e expressas por razões de prevalência (RPs). A prevalência de hipertensão autorreferida entre as mulheres foi 20,2% (IC95%: 17,5 – 23,1) e entre homens foi 29,0% (IC95%: 22,9 – 35,5). A prevalência de *diabetes* entre as mulheres foi 6,9% (IC95%: 5,2 – 8,8) e entre homens foi 12,2% (IC 95%: 8,1 – 17,3). A prevalência de ambas as condições cresceu significativamente com a idade. RPs brutas e ajustadas não indicaram associação entre o estado socioeconômico e as condições autorreferidas.

Palavras-chave: condições de saúde crônicas múltiplas, serviços de saúde, estudos transversais.

Introduction

Hypertension and *diabetes* are two chronic conditions that have high economic impact on the social and healthcare systems due their high prevalence and associated diseases. The average age of the world's population is increasing rapidly, which contributes to the rise in the prevalence of both conditions.

Diabetes is a chronic metabolic disorder characterized by hyperglycemia resulting in defects in the properties and secretion of insulin, or both (Rojo-Botello, García-Hernández, & Moreno-Fierros, 2012). There are two main types of *diabetes*. The type-1 *diabetes*, also called insulin dependent *diabetes* mellitus, is characterized by the destruction of insulin-producing beta cells in the pancreas. The type-2 *diabetes*, also called non-insulin dependent *diabetes* mellitus, is caused by a decreased sensitivity of target tissues to insulin. It is estimated that, by the year of 2030, the prevalence of *diabetes* in South and Central Americas will be 7.8% after age-standardization (Shaw, Sicree, & Zimmet, 2010). Hypertension is a common disorder of multifactorial origin in which blood pressure elevation is only one sign. It constitutes a major risk factor for events such as stroke, heart disease, and kidney failure. It is estimated that approximately one in four adults has hypertension and that more than 1.5 billion people worldwide will be affect in 2025 (Olsen et al., 2016).

Among the components recommended by the World Health Organization (WHO) to address hypertension, there are integrated programs at the primary healthcare level for control of the disease

(World Health Organization [WHO], 2016). Therefore, effective treatments should be available at the primary healthcare level aiming to control hypertension and thus reduce the risk of complications. Studies on users of primary healthcare services are important to improve the general health in the community.

This observational cross-sectional study aimed to estimate the prevalence of self-reported hypertension and *diabetes* among users of primary healthcare services in Ribeirão Preto, Brazil, and to identify variables which may be associated with these chronic conditions. The present study differs from previously reported works in at least three ways. First, the information was collected through face-to-face interviews carried out at health care units. Second, it was focused on a specific population of users rather than general population. Third, there are a few articles describing the concurrent prevalence of self-reported *diabetes* and hypertension.

Material and methods

Ribeirão Preto is a city located in the north-eastern region of the State of São Paulo, with a population of around 674 thousand inhabitants. The city has an economy based primarily on agricultural activities mostly related to sugar cane industry, with the local health care system being divided into five geographical areas with diverse demographic characteristics, namely, North, South, Central, East and West districts. It is estimated that 52% of the urban population of Ribeirão Preto have been exclusively using the public health care resources, whereas 80% use these services occasionally (Prefeitura Municipal de Ribeirão Preto, 2011).

The study design was based on a stratified sampling scheme in which 41 primary health care units were grouped according to geographical area and a local social vulnerability index (IPVS) regarding the areas of coverage. This index was proposed by the Brazilian State Data Analysis System Foundation (SEADE) as it rates geographical areas into six categories of social vulnerability (Schumann & Moura, 2015). Twelve strata and one health care unit from each stratum were randomly selected for the interviews. The sample size was determined by considering the mean number of monthly visits in each health care unit and the hypertension and *diabetes* prevalence in this population was estimated at 95% confidence level and absolute precision of 3% to estimate. This prevalence was set at 50% in each stratum to maximize the variance, which resulted in a minimum sample size of 1,055 individuals for this study. Data were collected from August 2015 to May 2016 through face-to-face interviews conducted by three trained interviewers from. The inclusion criteria were age of 18 years or older and user of the primary health care services of Ribeirão Preto.

People with self-reported hypertension were defined as those who responded "yes" to the question: "Have you ever heard from a doctor, at some moment in your life, that you have hypertension?" Persons with self-reported *diabetes* were identified in a similar manner. Socioeconomic status was assessed by using the classification proposed by the Brazilian Association of Market Research Institutions, which is based on accumulation of material goods and schooling of the household head. Possible ranks are A, B1, B2, C1, C2, D and E, with people from more privileged socioeconomic classes being labeled as A. Education level was ranked into five groups: insufficient school (including illiterates, people who never attended school or people who did not complete elementary school I), elementary school II (incomplete or complete), intermediate school (incomplete or complete), and higher education (incomplete or complete). The Alcohol Use Disorder Identification Test (AUDIT) was used to rank the pattern of alcohol use into four risk zones: (I) non-drinker, (II) non-hazardous, (III) hazardous and (IV) harmful drinking (Babor & Robaina, 2016).

Prevalence was estimated by using the exact method at 95% confidence interval (Fleiss, Levin, & Paik, 2013). Log-binomial regression models were fitted to the data (Chen, Shi, Qian, & Azen, 2014) and prevalence ratios (PRs) were used as measures of association between independent variables and each dependent variable (i.e. hypertension and *diabetes*). Inferences for PRs were based on 95% confidence intervals so that intervals not including 1 indicated that the respective variable is associated at a significance level of 0.05 (similar to $P < 0.05$). SAS 9.3 software was used for all statistical analyses. Research was conducted according to current ethical norms and the project was approved (protocol number 931.952) by the Research Ethics Committee of the Clinical Hospital, Ribeirão Preto Medical School, University of São Paulo (USP).

Results and discussion

The sample was composed of 841 (80%) women with mean age of 39.5 years (SD 14.9) and 214 (20%) men with mean age of 45.1 years (SD 15.3). The minimum age was 18 years old. The low frequency of men attending the health care units is a well-known phenomenon in Brazil and this has been discussed in a

number of publications (Couto et al., 2010; Gomes, Nascimento & Araújo, 2007; Gomes et al., 2011).

The prevalence of self-reported hypertension among women was 20.2% (95% CI: 17.5-23.1) and among men 29.0% (95% CI: 22.9-35.5), while the prevalence of self-reported *diabetes* among women was 6.9% (95% CI: 5.2-8.8) and among men 12.2% (95% CI: 8.1-17.3). The concurrent prevalence of self-reported *diabetes* and hypertension was 5.4% (95% CI: 4.1-6.9) in the overall sample, 4.3% among women (95% CI: 3.0-5.9) and 9.8% (95% CI: 6.1-14.6) among men.

The prevalence of self-reported hypertension and *diabetes* according to the characteristics of the respondents are showed in Tables 1 and 2, respectively. The prevalence of both conditions increases significantly with age. A higher prevalence of both conditions was observed among respondents with poor self-perception of health. No association between socioeconomic status and self-reported chronic conditions was detected according to crude and adjusted PRs.

Table 3 shows the concurrent prevalence rates of self-reported *diabetes* and hypertension according to characteristics of the respondents. A large increase in the prevalence was observed with ageing. Table 3 also shows higher prevalence among respondents with poor self-perception of health and ex-smokers.

Table 1. Crude and age-and-sex adjusted prevalence ratios (PR) for hypertension (n = 1,055).

Variables	Total	Hypertension		Crude PR (95% CI)	Adjusted PR (a) (95% CI)
		n	%		
Sex					
Women	841	170	20.2	Reference	Reference
Men	214	62	29.0	1.43 (1.11 – 1.84)*	1.07 (0.86 – 1.35)
Age group (years)					
18 – 30	320	11	3.4	Reference	Reference
31 – 40	250	38	15.2	4.42 (2.30 – 8.47)*	4.41 (2.30 – 8.45)*
41 – 50	173	43	24.9	7.23 (3.82 – 13.66)*	7.18 (3.80 – 13.56)*
51 – 60	164	61	37.2	10.82 (5.85 – 19.99)*	10.75 (5.82 – 19.89)*
> 60	148	79	53.4	15.53 (8.52 – 28.29)*	15.27 (8.36 – 28.89)*
Educational level					
Higher education	126	18	14.3	Reference	Reference
Intermediate school	517	85	16.4	1.15 (0.71 – 1.84)	1.44 (0.93 – 2.21)
Elementary school II	221	56	25.3	1.77 (1.09 – 2.88)*	1.35 (0.86 – 2.11)
Elementary school I	61	18	29.5	2.06 (1.15 – 3.68)*	0.96 (0.55 – 1.66)
Insufficient	130	55	42.3	2.96 (1.84 – 4.75)*	1.62 (1.04 – 2.50)*
Marital status					
Single	247	30	12.1	Reference	Reference
Married	648	137	21.1	1.74 (1.20 – 2.51)*	1.02 (0.72 – 1.44)
Divorced	107	36	33.6	2.77 (1.80 – 4.25)*	1.14 (0.76 – 1.72)
Widowed	53	29	54.7	4.51 (2.97 – 6.82)*	1.33 (0.88 – 2.00)
Socioeconomic status					
A or B1	65	13	20.0	Reference	Reference
B2	290	69	23.8	1.19 (0.70 – 2.02)	1.21 (0.75 – 1.95)
C1	368	79	21.5	1.07 (0.63 – 1.81)	1.15 (0.72 – 1.85)
C2	235	50	21.3	1.06 (0.61 – 1.83)	1.24 (0.76 – 2.03)
D or E	97	21	21.7	1.08 (0.58 – 2.00)	1.58 (0.91 – 2.73)
Self-perception of health					
Good	735	101	13.7	Reference	Reference
Regular	280	114	40.7	2.96 (2.35 – 3.73)*	2.16 (1.74 – 2.68)*
Poor	40	17	42.5	3.09 (2.06 – 4.63)*	2.02 (1.42 – 2.87)*
Smoking status					
Never smoked	697	123	17.7	Reference	Reference
Ex-smokers	216	72	33.3	1.89 (1.47 – 2.42)*	1.16 (0.87 – 1.56)
Current smokers	142	37	26.1	1.48 (1.07 – 2.03)*	1.25 (0.99 – 1.57)
AUDIT risk level					
I	889	197	22.2	Reference	Reference
II	136	30	22.1	0.99 (0.70 – 1.40)	1.14 (0.82 – 1.56)
III or IV	30	5	16.7	0.75 (0.33 – 1.69)	0.92 (0.42 – 2.00)
Self-reported *diabetes*					
No	971	175	18.0	Reference	Reference
Yes	84	57	67.9	3.76 (3.08 – 4.59)*	1.99 (1.62 – 2.45)*

(a) PR adjusted for sex and age. * 95% CI does not cover the value of 1, suggesting a significant effect (similar to $p < 0.05$).

Table 2. Crude and age-and-sex adjusted prevalence ratios (PR) for *diabetes* (n = 1,055).

	Total	*Diabetes*		Crude PR (95% CI)	Adjusted PR (a) (95% CI)
		n	%		
Sex					
Women	841	58	6.9	Reference	Reference
Men	214	26	12.2	1.76 (1.13 – 2.73)*	1.25 (0.82 – 1.91)
Age group (years)					
18 – 30	320	2	0.6	Reference	Reference
31 – 40	250	10	4.0	6.40 (1.41 – 28.95)*	6.32 (1.39 – 28.60)*
41 – 50	173	14	8.1	12.95 (2.97 – 56.31)*	12.67 (2.91 – 55.15)*
51 – 60	164	22	13.4	21.46 (5.10 – 90.16)*	21.04 (5.00 – 88.43)*
> 60	148	36	24.3	38.92 (9.49 – 159)*	37.08 (9.01 – 152)*
Educational level					
Higher education	126	7	5.6	Reference	Reference
Intermediate school	517	25	4.8	0.87 (0.38 – 1.97)	1.17 (0.53 – 2.57)
Elementary school II	221	25	11.3	2.03 (0.90 – 4.57)	1.54 (0.70 – 3.36)
Elementary school I	61	11	18.0	3.25 (1.32 – 7.96)*	1.24 (0.51 – 3.00)
Insufficient	130	16	12.3	2.22 (0.94 – 5.20)	1.14 (0.49 – 2.61)
Marital status					
Single	247	14	5.7	Reference	Reference
Married	648	55	8.5	1.50 (0.84 – 2.64)	0.76 (0.44 – 1.31)
Divorced	107	8	7.5	1.32 (0.57 – 3.05)	0.46 (0.20 – 1.05)
Widowed	53	7	13.2	2.33 (0.98 – 5.49)	0.48 (0.20 – 1.12)
Socioeconomic status					
A or B1	65	9	13.8	Reference	Reference
B2	290	28	9.7	0.69 (0.34 – 1.41)	0.75 (0.39 – 1.43)
C1	368	21	5.7	0.41 (0.19 – 0.86)*	0.45 (0.22 – 0.89)*
C2	235	17	7.2	0.52 (0.24 – 1.12)	0.69 (0.33 – 1.40)
D or E	97	9	9.3	0.67 (0.28 – 1.60)	1.11 (0.49 – 2.47)
Self-perception of health					
Good	735	25	3.4	Reference	Reference
Regular	280	51	18.2	5.35 (3.38 – 8.47)*	1.55 (1.54 – 1.55)*
Poor	40	8	20.0	5.88 (2.83 – 12.20)*	1.55 (1.54 – 1.55)*
Smoking status					
Never smoked	697	43	6.2	Reference	Reference
Ex-smokers	216	32	14.8	2.40 (1.55 – 3.70)*	1.52 (1.00 – 2.30)
Current smokers	142	9	6.3	1.03 (0.51 – 2.06)	0.82 (0.41 – 1.63)
AUDIT risk level					
I	889	74	8.3	Reference	Reference
II	136	7	5.1	0.61 (0.29 – 1.31)	0.66 (0.31 – 1.41)
III or IV	30	3	10.0	1.21 (0.40 – 3.59)	1.56 (0.52 – 4.63)
Self-reported hypertension					
No	823	27	3.3	Reference	Reference
Yes	232	57	24.6	7.49 (4.85 – 11.56)*	3.85 (2.43 – 6.11)*

(a) PR adjusted for sex and age. * 95% CI does not cover the value of 1, suggesting a significant effect (similar to $p < 0.05$).

The strengths of the present study include the use of a sample composed by individuals who were personally interviewed. In this sense, important studies like the VIGITEL (Telephone-based Surveillance of Risk and Protective Factors for Chronic Diseases) study (Schmidt et al., 2009), have been based on a sample limited to adults interviewed at home by telephone.

The present study has shown a higher prevalence of self-reported hypertension among men (29.0%) than among women (20.2%), although this difference was no longer significant after adjustment for age group (Table 1). In a large study on self-reported hypertension in the Brazilian capitals (Andrade, Malta, Iser, Sampaio, & Moura, 2014), prevalence rates of 19.6% and 24.9% were found in men and women, respectively, in the city of São Paulo. Other study using data from the National Household Sample Survey (PNAD) (Muniz et al., 2012) estimated that in the South-eastern region of Brazil the prevalence of self-reported hypertension among men is 12.4% and among women is 16.5%. The prevalence rates estimated in the present study are closer to those reported in the National Health Survey (NHS) of 2013 (Malta, Santos, Perillo, & Szwarcwald, 2016), where blood pressure was measured by using a calibrated digital device. Considering the adult population of the state of São Paulo, the prevalence of hypertension was 27.6% among men and 21.3% among women.

Table 3. Crude and age-and-sex adjusted prevalence ratios (PR) for hypertension and *diabetes* (n = 1,055).

Variables	Total	Hypertension and *diabetes*		Crude PR (95% CI)	Adjusted PR (a) (95% CI)
		n	%		
Sex					
Women	841	36	4.3	Reference	Reference
Men	214	21	9.8	2.3 (1.3 – 3.8)*	1.6 (0.9 – 2.6)
Age group (years)					
18 – 30	320	1	0.3	Reference	Reference
31 – 40	250	4	1.6	5.1 (0.5 – 45.5)	4.9 (0.5 – 44.3)
41 – 50	173	10	5.8	18.5 (2.3 – 143)*	17.6 (2.2 – 136)*
51 – 60	164	15	9.2	29.3 (3.9 – 219)*	27.9 (3.7 – 209)*
> 60	148	27	18.2	58.4 (8.0 – 425)*	52.8 (7.2 – 386)*
Educational level					
Higher education	126	6	4.8	Reference	Reference
Intermediate school	517	15	2.9	0.6 (0.2 – 1.5)	0.8 (0.3 – 1.9)
Elementary school II	221	18	8.1	1.7 (0.6 – 4.2)	1.6 (0.6 – 3.9)
Elementary school I	61	6	9.8	2.1 (0.6 – 6.1)	0.9 (0.3 – 2.7)
Insufficient	130	12	9.2	1.9 (0.7 – 5.0)	1.3 (0.4 – 3.2)
Marital status					
Single	247	9	3.6	Reference	Reference
Married	648	38	5.8	1.6 (0.7 – 3.3)	0.7 (0.3 – 1.5)
Divorced	107	5	4.7	1.3 (0.4 – 3.7)	0.4 (0.1 – 1.2)
Widowed	53	5	9.4	2.6 (0.9 – 7.4)	0.5 (0.1 – 1.4)
Socioeconomic status					
A or B1	65	7	10.8	Reference	Reference
B2	290	20	6.9	0.6 (0.2 – 1.5)	0.7 (0.1 – 1.6)
C1	368	13	3.5	0.3 (0.1 – 0.8)*	0.3 (0.1 – 0.9)*
C2	235	13	5.5	0.5 (0.2 – 1.2)	0.7 (0.3 – 1.8)
D or E	97	4	4.1	0.4 (0.1 – 1.3)	0.7 (0.2 – 2.3)
Self-perception of health					
Good	735	19	2.6	Reference	Reference
Regular	280	33	11.8	4.6 (2.6 – 7.9)*	4.9 (2.8 – 8.4)*
Poor	40	5	12.5	4.8 (1.9 – 12.3)*	4.5 (1.7 – 11.2)*
Smoking status					
Never smoked	697	26	3.7	Reference	Reference
Ex-smokers	216	25	11.6	3.1 (1.8 – 5.3)*	1.8 (1.1 – 3.1)*
Current smokers	142	6	4.2	1.1 (0.4 – 2.7)	0.8 (0.3 – 2.1)
AUDIT risk level					
I	889	51	5.7	Reference	Reference
II	136	5	3.7	0.6 (0.2 – 1.6)	0.6 (0.2 – 1.6)
III or IV	30	1	3.3	0.6 (0.1 – 4.1)	0.7 (0.1 – 4.9)

(a) PR adjusted for sex and age. * 95% CI does not cover the value of 1, suggesting a significant effect (similar to $p < 0.05$).

In a previous study (Torquato et al., 2003), the prevalence of *diabetes* in the urban population aged 30-69 years was estimated based on WHO criteria, where previously-diagnosed individuals and those with fasting or two-hour capillary glycemia higher than 200 mg dL^{-1} were considered to be diabetics. It was founded that men and women have similar rates of *diabetes* (12.0 and 12.1%, respectively). By using this same age group, the present study found a prevalence of self-reported *diabetes* of 14.4% among men and of 8.6% among women. Considering all the adult individuals, the prevalence of self-reported *diabetes* reported in the present study was 6.9% among women. This value is very close to that found in the NHS (Iser et al., 2015), showing a prevalence of self-reported *diabetes* of 7.0% for the country's female population. However, the prevalence of self-reported *diabetes* among men obtained in the present study is higher than that reported in NHS (Iser et al., 2015).

In the present study, the concurrent prevalence rates of self-reported *diabetes* and hypertension was estimated as 5.4%. This prevalence is higher than that reported in a previous study based on PNAD database (3.3% for the whole country and 3.9% for the South-eastern region) (Freitas & Garcia, 2012).

The main limitation of the presented study concerns the validity of self-reported hypertension and *diabetes*. Three Brazilian large population-based studies showed sensitivities of 72.1, 84.3 and 71.1% for self-reported hypertension (Lima-Costa, Peixoto, & Firmo, 2004; Chrestani, Santos & Matijasevich, 2009; Lima-Costa, Peixoto, Firmo, & Uchoa, 2007) and specificities of 86.4, 87.5 and 80.5%, respectively. The NHANES III Survey

showed a sensitivity of 71% and a specificity of 90% (Vargas, Burt, Gillum, & Pamuk, 1997). On the other hand, there are a few studies on the validity of self-reported *diabetes* in Brazilian populations. Although studies conducted outside Brazil have indicated that self-report of *diabetes* shows little disagreement with other sources of information (Jackson et al., 2014). A Brazilian study showed a low sensitivity (57.1%), suggesting that self-reported *diabetes* may not be suitable as an indicator of disease prevalence for the Brazilian population (Lima-Costa et al., 2004). Apart from the people's poor knowledge of their own health status, it is known that *diabetes* and hypertension rarely cause symptoms in the early stages and many people go undiagnosed (WHO, 2016). Therefore, in any case, estimates of self-reported hypertension and *diabetes* prevalence are always subject to underreporting. Despite these problems, the values of prevalence obtained in this study are satisfactorily close to those reported in works using objective criteria to diagnose hypertension (Malta et al., 2016) and *diabetes* (Torquato et al., 2003). This demonstrates the utility of the results to describe the frequency of these health conditions among users of primary health care services in Ribeirão Preto.

Another important limitation of this study is its cross-sectional design and thus caution should be taken in interpreting the associations showed in Tables 1 and 2. As the effect of exposure time is not considered here, more detailed studies are needed to address the issues of time-lag and reporting biases – the major problems in interpreting these findings.

Conclusion

In conclusion, knowledge on the prevalence of *diabetes* and hypertension in Brazil is essential for supporting prevention and control measures that will contribute to reducing the impact of cardiovascular diseases at population level, and the present study can be considered a small contribution in this direction.

Acknowledgements

This work was supported by grants from Brazilian agencies CNPq (Grant Number 305942/2012-3), FAPESP (Grant Number 14/14020-6) and FAEPA (Grant Number 496/2017). The authors would like to express their appreciation to an anonymous reviewer for helpful comments.

References

Andrade, S. S. C. A., Malta, D. C., Iser, B. M., Sampaio, P. C., & Moura, L. (2014). Prevalence of self-reported arterial hypertension in Brazilian capitals in 2011 and analysis of its trends in the period between 2006 and 2011. *Revista Brasileira de Epidemiologia*, *17*(Suppl1), 215-226. DOI: 10.1590/1809-4503201400050017

Babor, T. F., & Robaina, K. (2016). The Alcohol Use Disorders Identification Test (AUDIT): A review of graded severity algorithms and national adaptations. *The International Journal of Alcohol and Drug Research*, *5*(2), 17-24. DOI: 10.7895/ijadr.v5i2.222

Chen, W., Shi, J., Qian, L., & Azen, S. P. (2014). Comparison of robustness to outliers between robust Poisson models and log-binomial models when estimating relative risks for common binary outcomes: a simulation study. *BMC Medical Research Methodology*, *14*(1), 82. DOI: 0.1186/1471-2288-14-82

Chrestani, M. A. D., Santos, I. D. S. D., & Matijasevich, A. M. (2009). Self-reported hypertension: validation in a representative cross-sectional survey. *Cadernos de Saúde Pública*, *25*(11), 2395-2406. DOI: 10.1590/S0102-311X2009001100010

Couto, M. T., Pinheiro, T. F., Valença, O., Machin, R., Silva, G. S. N. D., Gomes, R., ... Figueiredo, W. D. S. (2010). Men in primary healthcare: discussing (in) visibility based on gender perspectives. *Interface-Comunicação, Saúde, Educação*, *14*(33), 257-270. DOI: 10.1590/S1414-32832010000200003

Fleiss, J. L., Levin, B., & Paik, M. C. (2013). *Statistical methods for rates and proportions*. New York: John Wiley & Sons.

Freitas, L. R. S. D., & Garcia, L. P. (2012).Evolution of prevalence of *diabetes* and associated hypertension in Brazil: analysis of National Household Sample Survey, 1998, 2003 and 2008. *Epidemiologia e Serviços de Saúde*, *21*(1), 7-19. DOI: 10.5123/S1679-49742012000100002

Gomes, R., Moreira, M. C. N., Nascimento, E. F. D., Rebello, L. E. F. D. S., Couto, M. T., & Schraiber, L. B. (2011). Men don't come! Absence and/or invisibility in primary healthcare services. *Ciência & Saúde Coletiva*, *16*(Suppl1), 983-992. DOI: 10.1590/S1413-81232011000700030

Gomes, R., Nascimento, E. F. D., & Araújo, F. C. D. (2007). Why do men use health services less than women? Explanations by men with low versus higher education. *Cadernos de Saúde Pública*, *23*(3), 565-574. DOI: 10.1590/S0102-311X2007000300015

Iser, B. P. M., Stopa, S. R., Chueiri, P. S., Szwarcwald, C. L., Malta, D. C., Monteiro, H. O. D. C., ... Schmidt, M. I. (2015). Self-reported *diabetes* prevalence in Brazil: results from National Health Survey 2013. *Epidemiologia e Serviços de Saúde*, *24*(2), 305-314. DOI: 10.5123/S1679-49742015000200013

Jackson, J. M., DeFor, T. A., Crain, A. L., Kerby, T. J., Strayer, L. S., Lewis, C. E., ... Larson, J. C. (2014). Validity of *diabetes* self-reports in the Women's Health

Initiative. *Menopause*, *21*(8), 861-868. DOI: 10.1097/GME.0000000000000189

Lima-Costa, M. F., Peixoto, S. V., & Firmo, J. O. A. (2004). Validity of self-reported hypertension and its determinants (the Bambuí study). *Revista de Saúde Pública*, *38*(5), 637-642. DOI: 10.1590/S0034-89102004000500004

Lima-Costa, M. F., Peixoto, S. V., Firmo, J. O. A., & Uchoa, E. (2007). Validity of self-reported *diabetes* and its determinants: evidences from the Bambuí study. *Revista de Saúde Pública*, *41*(6), 947-953. DOI: 10.1590/S0034-89102007000600009

Malta, D. C., Santos, N. B. D., Perillo, R. D., & Szwarcwald, C. L. (2016). Prevalence of high blood pressure measured in the Brazilian population, National Health Survey, 2013. *São Paulo Medical Journal*, *134*(2), 163-170. DOI: 10.1590/1516-3180.2015.02090911

Muniz, L. C., Cascaes, A. M., Wehrmeister, F. C., Martínez-Mesa, J., Barros, A. J., & Menezes, A. M. B. (2012). Trends in self-reported arterial hypertension in Brazilian adults: an analysis of data from the Brazilian National Household Sample Survey, 1998-2008. *Cadernos de Saúde Pública*, *28*(8), 1599-1607. DOI: 10.1590/S0102-311X2012000800018

Olsen, M. H., Angell, S. Y., Asma, S., Boutouyrie, P., Burger, D., Chirinos, J. A., ... López-Jaramillo, P. (2016). A call to action and a lifecourse strategy to address the global burden of raised blood pressure on current and future generations: the Lancet Commission on hypertension. *The Lancet*, *388*(10060), 2665-2712. DOI: 10.1016/S0140-6736(16)31134-5

Prefeitura Municipal de Ribeirão Preto. (2011). *Fatores de risco relacionados à saúde da população residente na zona urbana de Ribeirão Preto (SP), 2008-2011*. Ribeirão Preto, SP: Devisa.

Rojo-Botello, N. R., García-Hernández, A. L., & Moreno-Fierros, L. (2012). Expression of toll-like receptors 2, 4 and 9 is increased in gingival tissue from patients with type 2 *diabetes* and chronic periodontitis. *Journal of Periodontal Research*, *47*(1), 62-73. DOI: 10.1111/j.1600-0765.2011.01405.x

Shaw, J. E., Sicree, R. A., & Zimmet, P. Z. (2010). Global estimates of the prevalence of *diabetes* for 2010 and 2030. *Diabetes Research and Clinical Practice*, *87*(1), 4-14. DOI: 10.1016/j.diabres.2009.10.007

Schmidt, M. I., Duncan, B. B., Hoffmann, J. F., Moura, L. D., Malta, D. C., & Carvalho, R. M. S. V. D. (2009). Prevalence of *diabetes* and hypertension based on self-reported morbidity survey, Brazil, 2006. *Revista de Saúde Pública*, *43*(Suppl2), 74-82. DOI: 10.1590/S0034-89102009000900010

Schumann, L. R. M. A., & Moura, L. B. A. (2015). Vulnerability synthetic indices: a literature integrative review. *Ciência & Saúde Coletiva*, *20*(7), 2105-2120. DOI: 10.1590/1413-81232015207.10742014

Torquato, M. T. D. C. G., Montenegro Junior, R. M., Viana, L. A. L., Souza, R. A. H. G. D., Lanna, C. M. M., Lucas, J. C. B., ... Foss, M. C. (2003). Prevalence of *diabetes* mellitus and impaired glucose tolerance in the urban population aged 30-69 years in Ribeirão Preto (São Paulo), Brazil. *São Paulo Medical Journal*, *121*(6), 224-230. DOI: 10.1590/S1516-31802003000600002

Vargas, C. M., Burt, V. L., Gillum, R. F., & Pamuk, E. R. (1997). Validity of self-reported hypertension in the National Health and Nutrition Examination Survey III, 1988–1991. *Preventive Medicine*, *26*(5), 678-685. DOI: 10.1006/pmed.1997.0190

World Health Organization [WHO]. (2016). *A global brief on hypertension: silent killer, global public health crisis*. Geneva, SW: World Health Organization.

Received on January, 9, 2017.
Accepted on April 11, 2017.

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