



## Research paper

## A nationwide population-based study of depression in Brazil



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## ABSTRACT

**Introduction:** The state of mental health of the population is considered to be an important and essential component of public health. Depression is the mental disorder with greatest prevalence in several countries around the world.

**Methods:** This was a nationwide Brazilian survey with household-based interviews. The sampling process was at random and cluster-based, and performed in three stages: census tracts, households and individuals. One inhabitant aged  $\geq 18$  years was selected per household. Individuals at greater risk of depression were identified through the Patient Health Questionnaire-9 (PHQ-9) algorithm, which uses internationally accepted diagnostic criteria. All analyses took into account sample weights.

**Results:** A total of 60,202 individuals were evaluated and the prevalence of positive screening for depression was 4.1% (95% CI: 3.8–4.4%). After adjustments for potential confounding factors, depression was found to be greater among women, individuals aged either 40–59 years or 80 years or over, individuals living in urban areas, those with lower educational level, smokers, and among individuals with arterial hypertension, diabetes and heart disorders. Skin colour, marital status and alcohol abuse were not associated with depression.

**Limitations:** Characteristics of respondents and non-respondents in the sample could not be compared because data about non-respondents was not available.

**Conclusions:** The prevalence of positive screening for depression in Brazil was similar to other studies conducted worldwide. In Brazil, this proportion reflects a considerable absolute number of people with greater risk of depression ( $\approx 5.5$  million) that may require adequate management through the health system and services.

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## 1. Introduction

Depression is one of the most prevalent mental disorders in several countries around the world (Baxter et al., 2013). This illness is responsible for considerable expenses on health care and losses in interpersonal relationships and in performing daily activities, such as studying and working (Ferrari et al., 2013a). A recent meta-analysis, which included studies carried out in 53 countries, found that the pooled point prevalence of depressive disorders

calculated from studies that used the diagnostic criteria either of the Diagnostic and Statistical Manual of Mental Disorders (DSM) or of the International Classification of Diseases (ICD) was 3.8% (95% CI: 3.1; 4.6), while the pooled prevalence of studies that used symptom scale/screening instruments was 12.1% (95% CI: 9.3; 15.7) (Ferrari et al., 2013b). Depression was more frequent in South America and in Southern Asia than in Western Europe, and more frequent among women (Ferrari et al., 2013b). When untreated, depression tends to become chronic and to become associated with a greater degree of incapacity to perform daily activities (Saxena et al., 2006). Recent estimates of the Global Burden of Disease indicate that major depressive disorder corresponds to close to 8% of Years Lived with Disability (YLDs) and 2.5% of Disability Adjusted Life Years (DALYs) (Ferrari et al., 2013a).

The state of mental health of the population is considered to be an important and essential component of public health (Prince et al., 2007; World Health Organization, 2005). However, the World Health Organization (WHO) Atlas project noted that there was systematic long-term negligence regarding the resources

**Abbreviations:** DSM-IV, Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; PHQ-9, Patient Health Questionnaire-9; PR, prevalence ratio; WHO, World Health Organization

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destined for mental health research, policies and services, especially in low and middle-income countries (Schmidt et al., 2011). In these countries, families assume a significant proportion of the economic and social burden of caring for mental health, due to the absence or ineffectiveness of specialized services (Alonso et al., 2008; Sartorius, 2007; Schulze, 2009).

Population-based surveys may provide reliable estimates for health care planning, pointing out population groups that are either vulnerable or at greater risk for a number disorders and risk factors. Few population-based government surveys with information about depression had been performed in Brazil over the past decades (Silva et al., 2014). More recently, in 2013, the Brazilian National Health Survey (PNS) investigated a series of morbidities, including depression.

Thus, the objective of the present study was to assess the prevalence and factors associated with increased risk of depression in Brazil, according to the different macro-regions of the country.

## 2. Methods

### 2.1. Sample and design

This was a cross-sectional national (Brazilian) study, which used data from the PNS, carried out between August and December 2013. The study was performed as a household-based survey with a randomized cluster-based sampling process, implemented in three stages in both urban and rural areas of the country: census tracts or tract groups (primary sampling units, PSUs), households (secondary units) and adult residents ( $\geq 18$  years) (tertiary units). This strategy ensured the national representativeness of the study. Greater details of the conception and methodology of the study can be obtained from other publications (Instituto Brasileiro de Geografia e Estatística, 2014; Souza-Júnior et al., 2015).

Briefly, after allowing for a forecasting non-response rate of 23%, the estimated sample size needed was 81,357 households (Souza-Júnior et al., 2015). Households that were either closed or uninhabited, individuals that refused to answer the interview, or those who were not found after three or more attempts, even with scheduled visits, were considered losses/refusals. In each household, one individual aged 18 years or over was randomly selected to answer the questionnaire. This selection was made from a list of eligible inhabitants that was drawn up at the time of the interview (Souza-Júnior et al., 2015). By the end of the sampling 69,954 households were selected. Interviews were conducted with one adult inhabitant in each of 60,202 households, thus resulting in a non-response rate of 13.9%. Data were gathered by means of a structured questionnaire that addressed a variety of health-related topics. The interviews were carried out using handheld computers (Personal Digital Assistants, PDAs). The data used in the present study were extracted on June 2, 2015, from the website [http://www.ibge.gov.br/home/estatistica/populacao/pns/2013/default\\_microdados.shtml](http://www.ibge.gov.br/home/estatistica/populacao/pns/2013/default_microdados.shtml), where they are made available unrestrictedly, without identifying the participants.

### 2.2. Evaluating depression

For the present study, the outcome was positive screening for depression measured using the Patient Health Questionnaire-9 (PHQ-9), which evaluated the frequency of depressive symptoms (depressed mood, anhedonia, trouble sleeping, tiredness or lack of energy, change of appetite or weight, feeling of guilt or uselessness, trouble concentrating, feeling slow or agitated and having recurrent thoughts about death or suicidal ideation), over the two

weeks prior to data collection. This instrument had previously been validated for use in Brazil (Santos et al., 2013). The algorithm of the test was used to identify individuals at higher risk of a major depressive episode (MDE), considering that the use of a specific cut-off point (i.e.  $\geq 9$ ) is susceptible to the influence of social, demographic and cultural factors, leading to different performances of the instrument according to the context in which it is applied (Santos et al., 2013). The algorithm defines the test as positive in the presence of five or more symptoms, provided that at least one of these is either depressed mood or anhedonia, and that each symptom lasts for either one week or more or almost every day, with the exception of the symptom regarding suicidal thoughts, which includes a frequency of less than one week. The depression severity was described using the PHQ-9 score as recommended by Kroenke et al. (2001). The thresholds classified depression severity as follows: none (1–4 points), mild (5–9), moderate (10–14), moderately severe (15–19) and severe (20–27 points).

### 2.3. Co-variables investigated

The characteristics evaluated included: geographical area of residence (urban/rural); sex (male and female); age (18–29; 30–39; 40–49; 50–59; 60–69; 70–79; and 80 years or over); skin colour (white, black and others: yellow, brown and indigenous); years of education (0; 1–8; 9–11; 12 or more); marital status (married; separated/divorced; widowed; single or without a partner); current smoker (yes/no); current alcohol abuse (yes/no); self-reported medical diagnosis of arterial hypertension, diabetes mellitus and cardiac disorders (yes/no); and region of residence (Northern, Northeastern, Southeastern, Southern, Central-Western).

Smokers were considered to be individuals who reported either daily or sporadic use of tobacco. Abusive use of alcohol was considered for men to be consumption of  $\geq 5$  doses of alcoholic beverages on a single occasion over the thirty days prior to the interview, while for women, abusive use was considered to be  $\geq 4$  doses.

### 2.4. Data analysis

Data analysis was carried out using the Stata software, version 12.1 (Stata Corp., College Station, United States). All analyses were stratified according to region of residence and carried out using the *svyset* command, which takes into consideration sample weights (Barros and Hirakata, 2003). Sample weights were defined for the PSU, households and all inhabitants, as well as for the selected inhabitant. Detailed information about PNS sample weights and sampling process was published elsewhere (Damacena et al., 2015; Souza-Júnior et al., 2015). The results from the sample were expanded for the Brazilian population.

A descriptive analysis was carried out initially with calculation of frequencies and their respective 95% confidence intervals (CI). The adjusted analysis was performed using Poisson regression (Barros and Hirakata, 2003), based on a hierarchical model composed of three levels (Victora et al., 1997). This analysis took into account the effect of each variable in relation to the outcome and controlled for confounding among variables of the same level and higher levels. Variables that presented a *p* value  $< 0.20$  in each level were maintained in the adjusted analysis. Level one was composed of the geographical area of residence, demographic and socioeconomic variables. Level two included behavioural variables (smoking and alcohol abuse), while level three included morbidities. The Wald test for heterogeneity and the linear tendency test were used to assess associations. *p* values lower than 0.05 were considered statistically significant.

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