



# Pesticide exposure, tobacco use, poor self-perceived health and presence of chronic disease are determinants of depressive symptoms among coffee growers from Southeast Brazil



Catarine Lima Conti<sup>a,\*</sup>, Wagner Miranda Barbosa<sup>a</sup>, João Batista Pavesi Simão<sup>b</sup>,  
Adriana Madeira Álvares-da-Silva<sup>a</sup>

<sup>a</sup> Program of Post-Graduation in Biotechnology/Renorbio, Federal University of Espírito Santo, Alegre, ES, Brazil

<sup>b</sup> Coordination of Technology and Coffee Growing Course, Federal Institute of Espírito Santo, Alegre, ES, Brazil

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## ABSTRACT

The lifestyle and other factors associated with the appearance of several health conditions that affect quality of life in rural zone is an issue that has been increasingly explored. Brazil is the largest coffee-producing nation in the world and has been a considerable consumer of pesticides since 2008. The aim of the present study was to investigate factors that could be contributing to the appearance of depressive symptoms in rural workers. Two hundred twenty male volunteers from nine cities in Southeast Brazil completed the Beck Depression Inventory-II (BDI-II) questionnaire about depressive symptoms and provided other information about socio-demographic characteristics and additional confounding factors. The adjusted multivariate logistic analysis demonstrated that pesticide exposure, tobacco use, poor self-perceived health and the presence of chronic disease contribute as risk factors for the appearance of depressive symptoms at a level above ups and downs considered normal in the BDI-II. This survey contributes to the search for solutions to improve quality of life and mental health in the rural living to the extent that social determinants of depression are being investigated.

## 1. Introduction

The lifestyle and factors associated with the appearance of several conditions that affect the quality of life in the country is an issue that has been increasingly explored (Gambin et al., 2015; Pignatti and Castro, 2008, 2010; Tavares et al., 2015). Rural myths could make us believe that country life has only health benefits; however, studies have shown that rural living is far from the tranquility of “rural existence” (AIHW, 1998; Hansen, 1987).

Work and life conditions are very precarious, and the monoculture practiced in the world of agribusiness is an important source of distress and illness (Scopinho, 2010). Brazil is the largest coffee-producing nation in the world, and historically, for over 150 years, it has been the highest global producer of coffee beans (USDA, 2016). The Southeast region included in the present study belongs to the state of Espírito Santo, where coffee growing is the main and most traditional agricultural activity. Espírito Santo represents the second largest coffee producer in Brazil and the first worldwide in *Robusta* production (Cetcaf, 2014; USDA, 2016).

As a consequence of peculiar life style, researches have described the presence of depressive symptoms in agricultural workers compromising their mental health (Phillips and Deshpande, 2016; Rayens and Reed, 2014). In the present study, we investigated determinant factors that could be contributing to the appearance of these symptoms, that substantially compromise quality of life (Cruz et al., 2010), and, depending on the severity and intensity, its impact on general welfare can be up to 23 times greater than other physical diseases (Williams et al., 1995). Depression changes the way one sees the world, perceives reality, comprehends things and expresses emotions. Therefore, it is considered a disease that affects the entire body and human experience without fragmentation between the biological, mental and social issues. Risk factors were evaluated through a multivariate logistic model and these data may contribute to the search for public health policies to improve mental and general health of rural residents.

\* Correspondence to: Departamento de Biologia, Centro de Ciências Exatas, Naturais e da Saúde, Universidade Federal do Espírito Santo. Alto Universitário, S/N, Caixa Postal 16, 29500-000 Alegre, ES, Brasil.

E-mail address: [catarineconti@hotmail.com](mailto:catarineconti@hotmail.com) (C.L. Conti).

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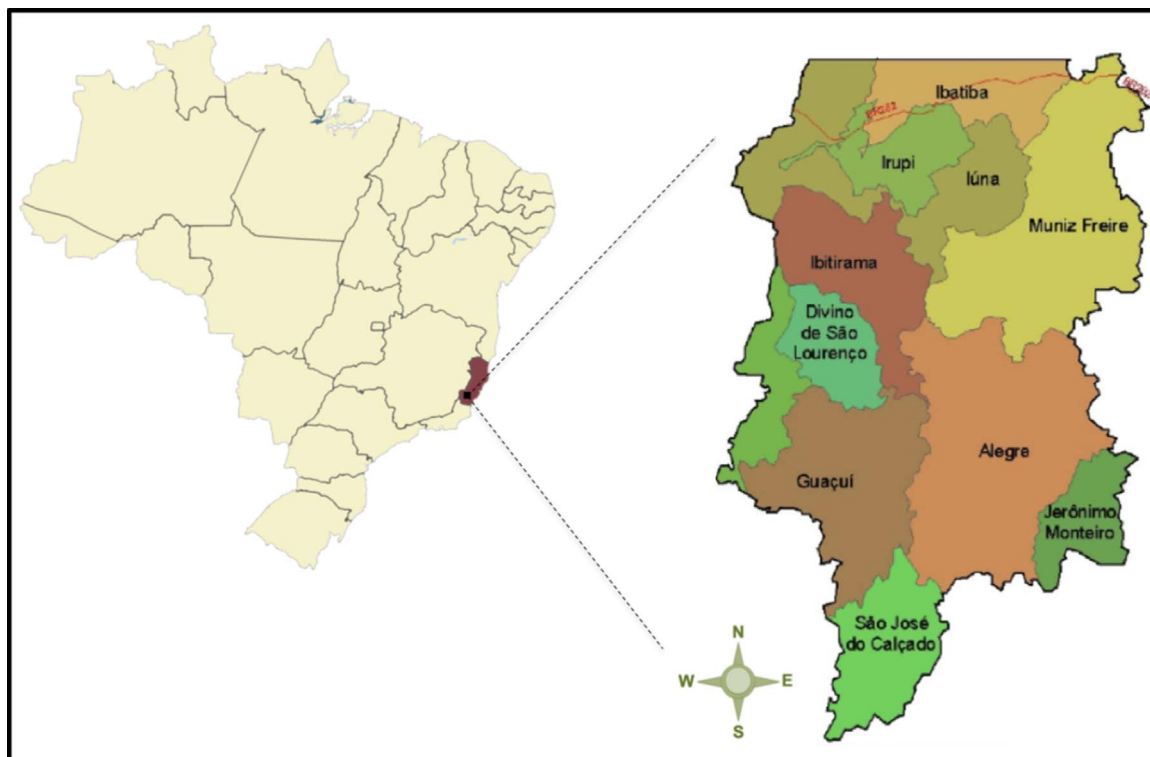


Fig. 1. Map of the Caparaó Capixaba consortium included in this study – the greatest *Robusta* producer worldwide.

## 2. Materials and methods

### 2.1. Subjects and ethics statement

This study included two hundred twenty ( $N = 220$ ) male volunteers from 18 to 65 years of age. All participants are rural workers from nine cities (Alegre, Does do Rio Preto, Guaçuí, Ibatiba, Ibitirama, Irupi, Iúna, Muniz Freire and Jerônimo Monteiro,) of Southeast Brazil that together form the Caparaó Capixaba Consortium (Fig. 1), the greatest *Robusta* producer worldwide. After a non-successful pilot testing within a random sample, the sampling was performed by convenience mainly because of the difficulty of contact by phone to schedule the meeting with them and the lack of participant availability once they live in remote areas with well-established routines. The number of participants in each city was calculated according to the percentage of the number of rural residents from that city and, in the total sample, the number was based on the rural population of the whole region, a total of 63,389 residents, according to data from the Brazilian Institute of Geography and Statistics (IBGE, 2010), considering a minimum prevalence of depressive symptoms of 14% according previous literature (Gomes-Oliveira et al., 2012; Silva et al., 2014), with a sampling error of 5%, a 95% confidence interval and 1.2 of design effect. It was selected only one participant per family to minimize homogeneity. This survey was conducted according to the ethical principles established by the Ethics Committee for Research at the Center of Health Sciences, Federal University of Espírito Santo, Brazil. All participants signed the informed consent forms. This research is part of a project approved by this ethics committee under registration #1.634.021.

### 2.2. Data collection

The secretary of the health department from each city was contacted to provide the consent letter. Then, the head of each community was contacted to schedule a meeting in which our group would explain the project to associated subjects and obtain their consent to participate. A few days later, the group returned to collect the socio-demographic

data, information about pesticide exposure (yes or no, according to any type of direct contact with pesticides) and other habit information like alcohol and tobacco use. Besides this structured questionnaire, it was additionally administered the validated Beck Depression Inventory-II questionnaire which gave rise to the primary outcome variable. The forms were administered by trained students and professionals of the University, while the Beck form was administered by only one or two trained people to minimize bias.

### 2.3. Beck Depression Inventory-Second Edition (BDI-II)

The BDI-II is not a depressive disorder diagnosis tool; instead, it is a self-report instrument that assesses the presence and severity of depressive symptoms in normal and psychiatric populations. It consists of 21 items that are rated on a 4-point scale, ranging from 0 to 3, with higher scores indicating more severe symptoms of depression (Jackson-Koku, 2016). It was already shown that the BDI-II is reliable and valid for measuring depressive symptomatology among Portuguese-speaking Brazilian non-clinical populations. The intraclass correlation coefficient of the BDI-II was 0.89, and Cronbach's alpha coefficient of internal consistency was 0.93 (Gomes-Oliveira et al., 2012).

### 2.4. Factors included in the analysis (variables)

Depressive symptoms were treated as the dependent variable. For statistical analysis, it was categorically coded as follows: low Beck score — up to 10 for the final score — according to the consensus parameter for ups and downs is considered normal for both rural and Brazilian populations (Iatchac et al., 2010; Levandovski et al., 2011), and high Beck score (total score greater than 10). The independent variables were as follows: age, marital status, Brazilian racial categories (self-reported), years of schooling, economic status of family (one salary refers to U\$ 282), alcohol use, tobacco use, combined alcohol and tobacco use, pesticide exposure, type of pesticide, self-perceived health and presence of chronic disease.

All variables are reported in Fig. 2.

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