EMPIRICAL ANALYSIS OF SOCIOECONOMIC FACTORS DETERMINING DEPRESSION IN BRAZIL

ANÁLISE EMPÍRICA DE DETERMINANTES SOCIOECONÔMICOS DA INCIDÊNCIA DA DEPRESSÃO NO BRASIL

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ABSTRACT

This article investigates empirically possible determinants of the incidence of depression, as a mood disorder, in Brazil. We analyze the impact of socioeconomic factors, focusing on the laboral context, such as occupation and economic activity. To do so, we performed a model of discrete responses called logit, in which we used procedures of complex samples to compare the impacts on depression in two Brazilian databases: the 2008 National Household Sample Survey (Pnad) and the National Health Research (PNS) 2013.

Keywords: Depression (mood disorder); Health Economics; Labor Market; Complex Sampling.

RESUMO

O presente artigo investiga empiricamente possíveis determinantes da incidência de depressão (enquanto distúrbio de humor), no Brasil. São analisados impactos de fatores socioeconômicos com enfoque no contexto laboral, tais como ocupação e atividade econômica. Para tanto, foi realizado um modelo de respostas discretas denominado *logit*, adotando-se os procedimentos de amostragem complexa, para comparar os impactos sobre a depressão em duas bases de dados: a Pesquisa Nacional por Amostra de Domicílio (Pnad) de 2008 e a Pesquisa Nacional de Saúde (PNS) de 2013.

Palavras-chave: Depressão; Economia da Saúde; Mercado de Trabalho; Amostragem Complexa.

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INTRODUCTION

The present article analyzes the impact of social and economic factors in Brazil as possible determinants of depression. We focus on relations between factors of the work context and the incidence of depression in individuals. To do so, we performed a micro econometric model called logit using complex sampling procedures to compare the results of two databases: the 2008 National Household Sample Survey (Pnad) and the 2013 National Health Research (PNS).

The paper is structured as follows: initially we present the theoretical basis through which we analyze the relationship between the incidence of depression and different contexts of work. In the sequence, we present the two databases here analyzed, as well as their characteristics. In the third session, we present the methodology and the design of the research carried out. Next, descriptive statistics and then we present the results of the proposed models. Finally, the main conclusions are drawn.

WORK AND DEPRESSION

According to data from PNS (IBGE, 2013), 7.72% of Brazilians suffer from depression and were diagnosed as so by a doctor (more than 11 million people). This disease affects around 4% of menand 11% of the total of women in 2013 in Brazil[1]. According to data from Pnad, from 2008 (IBGE, 2008), these values were, respectively: 5.34%; 2.92% and 7.59%, showing a significant increase.

Depression is an affective disorder that is characterized primarily by the lowering of mood, reduced energy and decreased in activities. It can range from mild to severe episodes. According to estimates by the World Health Organization (WHO), depression is the main disease in the global burden of diseases in the world (IBGE, 2013).

As stated by the American Psychiatric Association (APA, 2002), depressive disorders are a series of disorders that have in common the presence of sad, empty or irritable mood, accompanied by somatic and cognitive changes that affect the functioning capacity of an individual. What differs between different depressive disorders are aspects of presumed duration, momentum or etiology.

According to APA´s manual for diagnosing diseases DSM-IV, depression is a disorder in which a person experiences "depressed mood or a loss of interest or pleasure in daily activities for more than two weeks. Mood represents a change from the person's baseline" (American Psychiatric Association, 2002, p. 156). This disorder impair function of social, occupational or educational order and have as main criteria for diagnosing: "at least 5 of these 9, present nearly every day: 1. Depressed mood or irritable most of the day, nearly every day, as indicated by either subjective report (e.g., feels sad or empty) or observation made by others (e.g., appears tearful). 2. Decreased interest or pleasure in most activities, most of each day 3. Significant weight change (5%) or change in appetite 4. Change in sleep: Insomnia or hypersomnia 5. Change in activity: Psychomotor agitation or retardation 6. Fatigue or loss of energy 7. Guilt/worthlessness: Feelings of worthlessness or excessive or inappropriate guilt 8. Concentration: diminished ability

to think or concentrate, or more indecisiveness 9. Suicidality: Thoughts of death or suicide, or has suicide plan" (American Psychiatric Association, 2002, p. 156).

The research here presented focuses on worker´s health, we intend to analyze if work experiences in certain work contexts can affect workers´ mental health, represented here by the incidence of depression. The same interest is a focus of discussion of several theories in psychology, called by Bendassolli and Soboll (2011) as "clinical theories of work", such as the theory "psychopathology of work", "psychodynamics of work", "clinic of activity", "psychosociology", "ergology", among others (Bendassolli & Soboll, 2011). These theories focus on the dynamic relationships between individual's psychological structure and the work context in which they are inserted (Mendes, 2007), including in this context the management technologies to which they are submitted (Bruning, Faria & Marques Junior, 2017). The main idea underlining these theories is that experiences of pleasure and suffering can lead to health or illness. According to Tamayo (2004) these experiences are result of the interaction of three different dimensions:

1. The subjectivity of each worker: that corresponds to the person as singular, with its history, desires and needs;

2. The collectivity: that is, the interpersonal relations between equals and hierarchies, norms and values of social coexistence in the work;

3. The work context.

The work context is understood as the aggregate of three factors: (i) how work is organized in a given context: including organizational norms that regulate work in an organization: the division of labor, the content of tasks, the power relations that involve the hierarchical system, the modalities of command and responsibilities (Mendes, 2007); (ii) Working conditions: defined as the physical, chemical and biological environment of work, as well as the conditions of hygiene, safety and the anthropometric characteristics of the work station (Mendes, 2007); (iii) All human relations originated in the work context, including relations with hierarchies, managers, supervisors, clients, external agents as well as other workers (Mendes, 2007).

The founder of the theory of Psychodynamics of Work, Dejours (1987, 1997, 2000) argues that two types of contradiction may emerge from the confrontation between individual´s psychological structure and the work context in organizations: a contradiction concerning the encounter between the imaginary impression produced by the subject, which is product of one´s individual history, with the impression of reality, produced by the given work situation; another contradiction concerning the encounter between the diachronic impression (which is the individual´s singular history, its past, its designs and desires), with the synchronous register (which is constituted by the material, social and historical context in which the work relation takes place).

Dejours, Abdoucheli, Jayet e Betiol (1994) argue that a contradiction or incongruity between the diachronic and synchronic dimensions described above leads to suffering and can lead to mental and psychosomatic illness according to the organization of the personality of each individual. On the other hand, resonance between these registers enables pleasant experiences. About the experiences of suffering, the theory of Psychodynamics of Work understand that,

having in its extremes the mental illness on one hand and the psychological well-being on the other, it can be said that two conditions are necessary in order for the work to permit a condition of equilibrium: the first is that demands of intellectual, motor or psychosensorial nature are in agreement with the capacities of the individual, and, so been, may be a source of pleasure; moreover, the content of the work must be a source of sublimatory satisfaction for the individual (Dejours et al, 1994).

The obstacle to sublimation occurs when there are no organizational conditions for the establishment of symbolic resonance. In this way, the subject cannot benefit from the work to dominate his suffering and turn it into creativity. When this happens, the only way out is the vicious circle in which suffering contributes to destabilizing the subject, impelling him to illness (Dejours et al, 1994).

According to Dejours and colleagues the work context has broad effects on the psychological suffering, and can contribute to aggravate it, leading, possibly, to somatization and illness, or to subvert it in pleasure, contributing to a sense of well-being, to recognition and even to further development of one´s self-esteem and identity (Dejours et al, 1994).

We understand that research based on the theory of Psychodynamics of Work is traditionally carried out from a qualitative approach in Psychology, based on data collection through interviews and focal groups. However, in this work, inspired by the premises of this theory, we propose an econometric analysis to try to evidence these relations.

In this paper we adopt the assumption that the work context in different organizations can be portrayed, at least partially, by identifying the sector of economic activity in which the work is taking place (from the National Classification of Economic Activities (CNAE), defined as a working context in industry, commerce, services and in agriculture), along with identifying the characteristics of the occupation in each of these areas - from the Brazilian Classification of Occupations (CBO), which we will simplify in: work context characteristic of higher, middle, manual and domestic occupations, as suggested by Machado, Oliveira and Carvalho (2009).

We assume that different companies from the same sector of activity, with similar occupations, end up providing work contexts similar to their workers, so aspects of health, technology, environment, safety, etc., would be intrinsically addressed in these variables.

We also analyze a variable that indicates the worker´s weekly working day to incorporate this aspect of the work context of a given occupation and sector.

The study proposed here is limited to measurable characteristics available as secondary data from national sensory surveys. We understand that the adopted method leaves aside subjective aspects that individually constitute the personality and capacity to face adverse situations of each individual. As the purpose of the paper is to evaluate, in a macro sense, if there is empirical evidence about the impact of factors of the work context on the incidence of depression. These other issues will not be addressed, but we must be aware of the limitations imposed by the proposed model.

Additionally, we have to keep in mind that even if the conditions experienced in the organization of work are similar for several workers and the pressures arising from work strike them in a similar way, each individual will react in a singular way, according to the constitution of his personality (Bruning & Eberle, 2013).

DATABASES

The present study applied the same model to two different microdata databases: the 2008 National Household Sample Survey (Pnad) and the National Health Research (PNS) 2013, both made by the Brazilian Institute of Geography and Statistics (IBGE, 2008, 2013).

The purpose of using two databases was to validate the results, as well as to incorporate more observations (obtained through Pnad) and to use more recent data (via PNS).

The National Household Sample Survey (Pnad), created in 1967, is currently of annual frequency. It aims to investigate the socioeconomic characteristics of the Brazilian population, having permanent variables and others only sporadic collected. Examples of permanent variables are the typical characteristics of the population, education, work, income and housing (IBGE, 2008). Example of variables collected only occasionally are migration, fecundity, nuptiality, health, nutrition and other issues that are included in the system according to information needs for the country.

In 2008, the theme chosen for supplementary research was health, entitled "A Panorama of Health in Brazil - Access and use of services, health conditions and risk factors and health protection 2008". The theme had already been addressed in two other editions: from 1998 and 2003, in a periodicity of 5 years (IBGE, 2008).

For the application of the questionnaires, a stratified sampling plan with three selection stages is used: primary units - municipalities; secondary units - census tracts; and tertiary units - domiciliary units (private households and housing units in collective households) (IBGE, 2008). The selection is made using size probabilities. In the results obtained by the questionnaires a process of sample expansion is applied, so that they can reflect the statistics of the entire population. Because of that, it is important to use the correct weight in the estimates. We will leave explicit the weight to be used in the "methodological procedures" section of this paper.

The National Health Research (PNS) was carried out by the IBGE institute in agreement with the Ministry of Health as a substitute for the Pnad Health supplement that would come in 2013. This database is also national and home-based, but it has a deeper focus on Brazilian health. It has a broad questionnaire on the profile of the respondent, his family, his lifestyle, about the performance of the national health system, health conditions (Self-perceived and diagnosed), presence of chronic diseases, and risk factors (height, weight, waist circumference), pressure measurement, as well as laboratory tests for a subsample of 25% of census tracts (blood to investigate lipid profile, blood glucose and plasma creatinine; Urine for the purpose of assessing renal function and salt intake) (IBGE, 2013).

The sampling plan was a three-stage conglomerate sampling, with stratification of the primary sampling units. The census tracts or set of sectors make up primary sampling units (UPA), households are the second-stage units and residents aged 18 years or over define the third-stage units (IBGE, 2013). The method of selection of subsamples was performed by means of simple random sampling, in all the stages. Thus, for the treatment of PNS data, it is also necessary to adopt methods that consider complex sampling. The factors of expansion of the sample are also given by weights, in a manner analogous to PNAD.

METHODOLOGICAL PROCEDURES

The variable "depression" is dichotomous in the two databases, that is, it assumes values "0" if the person affirms that he or she does not have depression diagnosed by a doctor and "1" if he or she has.

As our interest is in the latent variable about depression, that is, we want to estimate the variable as being the chance of having the disease, it will become continuous. Thus, the appropriate models to deal with this issue are the discrete response models, such as probit or logit.

Although the relationship between work and mental illness has already been explored in the psychology literature, empirical research from microdata is scarce in Brazil. The study by Santos and Kassouf (2007) investigated the relationship between socioeconomic factors and mental depression with emphasis on the effects of education using data from the 2003 National Household Sample Survey (Pnad) and its special health supplement. This article served as insight for the work here presented. The econometric model adopted by these authors was a probit, estimated by maximum-likelihood, and performed separately for men and women. With that, they found evidence that some socioeconomic conditions may interfere with the likelihood of depression, and that higher educational levels may reduce the risk of depression.

However, unlike the aforementioned study, the present exercise will use the logit model because the estimation of marginal effects by the probit proved to be flawed in some of the models for the databases used, since it did not reach convergence by the maximum likelihood method. In addition, logit estimation using the odds ratio makes the result more easily interpretable, as well as assuming less strong assumptions about the marginal effect of the probit (which is normally used as the mean parameter effect).

To understand the odds ratio, consider the following formulation (Agresti & Kateri, 2014):

$$\text{Odds ratio} = \frac{\text{group 1 odds}}{\text{group 2 odds}} = \frac{\dfrac{p_1}{1 - p_1}}{\dfrac{p_2}{1 - p_2}}$$

Odds ratio greater than 1 will indicate a greater chance of depression in our model; Equal to 1 will indicate equal chances; and less than 1 will indicate lower chances of depression.

Having made this preamble justifying the choice of the econometric method to be used, we now present the design of the model.

Initially, as verified by the statistics already mentioned and by the literature in psychology, there is a significant difference in the affection by the depression between the female and male population. For this reason, the templates will be replicated separately for both gender.

We considered data from people between 18 and 80 years old, since in PNS only people over 18 of age are chosen to respond to the questionnaire. Thereby, we used three different models to contemplate the relationship between incidence of depression by sex and:

1. The occupation category;

2. The category of occupation and the sector of economic activity;

3. The occupation category, the economic activity sector and the control variables.

The variables were generated in an analogous way for the sample of Pnad and PNS, apart from the variable called DOENT that will be explained next. Therefore, the variables used are summarized in table 1:

Table 1
Study Variables **continue**

DEPRES	"Has any doctor or mental health professional (as a psychiatrist or psychologist) ever given you the diagnosis of depression?": it assumes values 0 or 1. It will be the dependent variable.
CATOCUP	Based on the occupation code provided in the microdata, according to CBO, it was grouped into the following categories (according to MACHADO et al 2009): 1. Superior; 2. Medium; 3. Manual; 4. Domestic.
GDESETOR	Based on information from the Cnae division, we performed a proxy to group the activities in a large sector, as follows: 1. Divisions 1 to 3: agricultural; 2. Divisions 5 to 39: industry; 3. Divisions 41 to 43: construction; 4. Divisions 45 to 47: trade; 5. Divisions 48 to 99: services.
REG	Region indicator: 1. Southeast (as a base); 2. South; 3. Northeast; 4. North; 5. Midwest.
RACE	Contains two categories according to the databases: 1. White and Yellow; 2. Blacks and Browns.

Table 1

Study Variables **continue**

EDU	Educational level of the person, separated into the following categories: 1. Uneducated; 2. Basic education incomplete or equivalent; 3. Complete basic education or equivalent; 4. Incomplete high school or equivalent; 5. Full high school or equivalent; 6. Incomplete graduation or equivalent; 7. Graduated.
JORNADA	Indicates the number of hours worked by the respondent in a week. It was categorized as follows: 1. Up to 25 hours per week; 2. From 26 to 44 hours a week; 3. 45 hours a week or more.
FETAR	Indicates the age group of the person. The following categories, modified from Bragança (2014), were used: 1. Young (between 18 and 24 years old); 2. Mature I: between 25 and 44 years; 3. Mature II (between 45 and 64 years); 4. Elderly (between 65 and 80 years).
CATREND	Categories of monthly income received in the reference month in the main job, according to minimum salaries: 1. No income to 1/4 of the minimum wage; 2. From 1/4 to 1/2 of the minimum wage; 3. From 1/2 to 1 minimum wage; 4. From 1 to 2 minimum wages; 5. From 2 to 3 minimum wages; 6. From 3 to 5 minimum wages; 7. From 5 to 10 minimum wages; 8. More than 10 minimum wages.

Table 1
Study Variables **conclusion**

CASAD	In the PNS: if the person lives with a spouse or partner. In Pnad: a proxy - if the family contains a member with the condition of "spouse", we considered this person and the "provider" of this same family as married (here the family identification was done concatenating the codes of the variables year, control, series and family number).
NUMFAM	Number of members in the family. Categories: 1. 1 person; 2. From 2 to 4 people; 3. From 5 to 7 people; 4. From 8 to 10 people; 5. From 10 to 14 people; 6. More than 14 people.
RESP	If the person is responsible for the family.
URBAN	If the person lives in urban areas.
DOENT	At Pnad: it was reported to have any of the chronic diseases listed in the research except for depression: back or spine disease; arthritis or rheumatism; cancer; diabetes; bronchitis or asthma; hypertension; heart disease; chronic renal failure; tuberculosis; tendonitis or tenosynovitis; cirrhosis. In PNS: "Has any doctor ever diagnosed any chronic, physical or mental illness or long-term illness (more than 6 months in duration)?". Assumes 0 (no) or 1 (yes).
VIOL	If in the last 12 months the respondent suffered any type of violence. In the PNS it was necessary to add two variables on violence from acquaintances and unknowns.
DEADCHILD	If the respondent has had a child dead before or after birth. This variable was valid only for women.

Source: Elaborated by the authors

Other variables were analyzed according to the possibility of affecting the latent variable of depression, such as alcohol consumption, tobacco consumption, physical activity, transit to work, having a living mother, if there was a traffic accident, work accident, among others that the literature points out as relevant. However, they were not included in the final models because they greatly restricted the number of observations available for their estimation.

Econometric models were generated separately for men and women using the software Stata 13. To illustrate, we transcript below the scripts for the model generated analyzing men´s responses:

Model 1:

xi: svy: logit DEPRES i.CATOCUP if SEX==1, or

Model 2:

xi: svy: logit DEPRES i.CATOCUP i.GDESETOR if SEX==1, or

Model 3:

xi: svy: logit DEPRES i.CATOCUP i.GDESETOR i.REG i.RACA i.EDU i.JORNADA i.FETAR i.CATREND CASAD i.NUMFAM RESP URBAN DOENT VIOL if SEX==1, or

Finally, it is worth noting how the complex sampling plan of the two surveys was treated, which the "svy" command before each model implements.

In Pnad, we use as the person's weight the variable v4729, as indicator of stratum at v4602 and as indicator of UPA at v4618.

The following command in Stata13 prepares the software to incorporate the complex sample design:

svyset v4618 [pweight= v4729], strata(v4602) singleunit(certainty)

The PNS follows a structure similar to Pnad, only changing the name of the variables: the person's weight is variable V00291; The stratum at V0024; And UPA to UPA_PNS. Care should be taken with the choice of the person's weight, since there are several weights in the base. The weight that incorporates the population projection, carrying out the expansion of the sample correctly is what we mentioned previously. Thus, the command for the PNS was:

svyset UPA_PNS [pweight= V00291], strata(V0024) singleunit(certainty)

With this model in mind, the next topic explores the descriptive statistics of the sample variables to sequentially show the results of the econometric models.

DESCRIPTIVE STATISTICS

The analysis of the descriptive statistics is important for the design of the econometric model because, besides helping to understand the direction of the impact, it provides elements about the dependence between the variables, helping to justify its insertion in the final model.

Table 2 shows the proportions of depression incidence by sex in both the 2008 PNAD database and the 2013 PNS.

Table 2
Proportion of people with depression according to sex

Sex	PNAD 2008			PNS 2013		
	Total sample	Without depression	With depression	Total sample	Without depression	With depression
Proportions in column:						
Male	47.85%	49.15%	26.24%	47.22%	49.14%	24.25%
Female	52.15%	50.85%	73.76%	52.78%	50.86%	75.75%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Proportions in line:						
Male	100.00%	96.88%	3.12%	100.00%	96.04%	3.96%
Female	100.00%	91.95%	8.05%	100.00%	88.92%	11.08%

Source: Elaborated by the authors, based on the microdata of Pnad 2008 and the PNS 2013.

The most recent basis shows that about 76% of depressed people are women. In addition, one can observe in Table 2 the proportion of women who have the disease: 11%, against about 4% of men. With this said, we can justify the need to separate the two publics in the evaluation of the causes and incidence of this psychosomatic illness.

The income, age, and number of family members also seems to be a differential between depressed and non-depressed people by sex. For instance, the database of PNS shows that the average income of the depressed people (R$2.051,30 for males and R$1457,53 for females) was higher than for the non-depressives(R$1.920,70 and R$1352,48, respectively), suggesting that the income can influence the incidence of the disease. Thus, we will keep the variable in the study, but categorizing it according to minimum wage levels.

The age variable also appears to be related to the disease, since depressives have a higher average age (45 years for males and 47.4 for females) than non-depressives (41.3 and 41.9 years, respectively). In addition, the number of family members seems to have an impact, with depressives having smaller families (3.3 in contrast with 3.6 for non-depressives). Santos and Kassouf[14] argue about the greater possibility of confidentiality and psychological support if the family is more numerous, which may influence these statistics, but there is also the income factor, where larger families usually have lower *per capita* income. Our model will control for both of these factors.

To justify the choice of the other explanatory variables, we observed the proportions contained in Table 3:

Table 3

Proportions of incidence of depression according to sex, by selected explanatory variables **continue**

Variable	Category	PNAD 2008				PNS 2013			
		Men		Women		Men		Women	
		Without depression	With Depressiom	Without depression	With Depressiom	Without depression	With Depressiom	Without depression	With Depressiom
CATOCUP (Occupation Category)	Superior	16.2%	19.4%	13.2%	11.8%	14.0%	23.3%	9.2%	5.5%
	Medium	14.0%	15.0%	22.0%	17.6%	22.5%	23.2%	29.0%	24.7%
	Manual	69.2%	64.7%	50.9%	56.3%	63.5%	53.5%	61.7%	69.8%
	Domestic	0.7%	0.9%	13.8%	14.3%	0.0%	0.0%	0.0%	0.0%
GDSETOR (Grand Sector)	Industry	17.3%	14.5%	13.1%	13.9%	16.0%	12.0%	10.3%	12.9%
	Construction	0.3%	0.7%	0.1%	0.1%	14.5%	17.6%	0.8%	0.1%
	Trade/ commerce	12.9%	12.3%	0.6%	0.4%	4.0%	3.0%	0.9%	1.0%
	Services	50.7%	52.8%	73.9%	70.4%	50.7%	55.3%	82.4%	78.8%
	Agriculture/ Livestock	18.9%	19.7%	12.4%	15.2%	14.7%	12.1%	5.7%	7.2%
REG (Region)	Southest	43.8%	50.3%	44.5%	48.6%	43.2%	53.3%	43.9%	47.2%
	South	14.8%	22.6%	14.1%	23.8%	14.7%	23.1%	13.5%	24.9%
	Northest	26.9%	18.2%	27.5%	17.5%	27.1%	15.7%	28.0%	18.1%
	North	7.1%	2.5%	6.8%	2.7%	7.3%	2.7%	7.2%	2.3%
	Midwest	7.3%	6.3%	7.1%	7.4%	7.6%	5.3%	7.4%	7.5%
RACE	White and Yellow	49.0%	58.8%	51.1%	59.6%	47.0%	61.6%	48.3%	54.4%
	Blacks and Browns	51.0%	41.2%	48.9%	40.4%	53.0%	38.4%	51.7%	45.6%
EDU (Education)	Uneducated	11.5%	14.7%	10.6%	13.4%	13.1%	8.4%	12.9%	12.7%
	Basic incomplet	34.8%	41.9%	32.0%	43.1%	25.8%	33.5%	23.3%	31.3%
	Basic complet	10.3%	9.9%	9.5%	9.7%	10.8%	8.7%	9.2%	10.3%
	High School incomplet	6.6%	4.0%	6.3%	4.2%	6.1%	4.0%	5.6%	4.4%
	High School complet	24.5%	19.1%	26.6%	18.3%	27.9%	25.0%	29.9%	23.1%
	Graduation incomplet	4.5%	3.6%	5.2%	2.5%	5.0%	5.2%	4.9%	3.8%
	Graduated	7.8%	6.8%	9.9%	8.7%	11.3%	15.2%	14.1%	14.4%

Table 3

Proportions of incidence of depression according to sex, by selected explanatory variables **continue**

Variable	Category	PNAD 2008				PNS 2013			
		Men		Women		Men		Women	
		Without depression	With Depressiom	Without depression	With Depressiom	Without depression	With Depressiom	Without depression	With Depressiom
JORNADA (work hours)	Up to 25 hours	6.5%	7.6%	14.8%	14.6%	6.5%	7.8%	11.2%	11.2%
	From 26 to 44 hours	43.5%	28.1%	28.8%	20.7%	44.6%	32.7%	30.1%	26.8%
	45 hours or more	50.1%	64.4%	56.4%	64.7%	48.8%	59.5%	58.7%	62.0%
FETAR (age)	Young	19.3%	6.8%	17.9%	4.8%	17.3%	10.3%	16.9%	5.8%
	Mature I	45.0%	34.6%	44.8%	36.0%	42.2%	38.5%	41.9%	37.4%
	Mature II	27.4%	43.4%	27.8%	44.2%	30.9%	39.9%	30.6%	43.1%
	Elderly	8.3%	15.3%	9.5%	15.0%	9.7%	11.2%	10.6%	13.8%
CATREND (Income in minimum wage)	No income to 1/4	1.9%	2.2%	2.9%	3.1%	1.6%	0.6%	2.5%	2.3%
	From 1/4 to 1/2	3.3%	2.3%	3.8%	3.7%	2.8%	3.3%	3.7%	3.4%
	From 1/2 to 1	14.4%	8.4%	12.4%	9.8%	13.0%	7.3%	12.4%	11.3%
	From 1 to 2	27.1%	17.1%	17.6%	13.1%	28.4%	22.3%	19.0%	15.9%
	From 2 to 3	11.8%	8.1%	4.9%	3.6%	14.0%	12.4%	5.9%	5.7%
	From 3 to 5	8.9%	6.9%	3.8%	2.7%	7.2%	5.8%	3.5%	3.2%
	From 5 to 10	5.1%	4.3%	2.2%	1.4%	5.7%	8.5%	2.4%	1.6%
	More than 10	27.2%	50.7%	52.5%	62.4%	27.2%	39.8%	50.7%	56.6%
CASAD (Merried)	Yes	37.5%	36.3%	42.5%	44.1%	35.6%	40.3%	40.6%	38.5%
	No	62.5%	63.7%	57.5%	55.9%	64.4%	59.7%	59.4%	61.5%
NUMFAM (Number of people in the Family)	1	5.3%	9.1%	4.5%	8.6%	7.6%	8.7%	5.4%	8.4%
	2-4	72.3%	73.9%	75.0%	76.0%	70.5%	69.3%	70.8%	73.5%
	5-7	20.3%	15.9%	18.5%	14.4%	19.7%	20.0%	21.5%	16.6%
	8-10	1.7%	1.0%	1.4%	0.8%	1.9%	2.0%	2.1%	1.4%
	11-14	0.2%	0.0%	0.2%	0.0%	0.3%	0.0%	0.2%	0.1%
	15 or more	0.2%	0.1%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%

Table 3

Proportions of incidence of depression according to sex, by selected explanatory variables **conclusion**

Variable	Category	PNAD 2008				PNS 2013			
		Men		Women		Men		Women	
		Without depression	With Depressiom	Without depression	With Depressiom	Without depression	With Depressiom	Without depression	With Depressiom
RESP (Family main Provider)	No	37.6%	31.3%	70.9%	59.4%	39.6%	44.4%	61.9%	55.7%
	Yes	62.4%	68.7%	29.1%	40.6%	60.4%	55.6%	38.1%	44.3%
URBAN	Rural	17.0%	12.2%	14.2%	11.5%	15.1%	10.4%	13.1%	10.0%
	Urban	83.0%	87.8%	85.8%	88.5%	84.9%	89.6%	86.9%	90.0%
DOENT (chronic disease)	No	67.5%	28.4%	60.1%	24.9%	85.1%	53.6%	80.3%	53.9%
	Yes	32.5%	71.6%	39.9%	75.1%	14.9%	46.4%	19.7%	46.1%
VIOL	No	97.8%	92.6%	98.1%	93.5%	94.9%	88.0%	94.9%	89.5%
	Yes	2.2%	7.4%	1.9%	6.5%	5.1%	12.0%	5.1%	10.5%
DEAD CHILD	No			80.2%	72.9%			71.5%	62.4%
	Yes		19.8%	27.1%			28.5% 37.6%		
Weight in Kg						76.23	77.9	66.84	69.81
Intake of alcoholic beverage (average of days in the week)						2.21	2.63	1.48	1.55
Tobacco (indicator mean)		0.24	0.29	0.14	0.21	0.19	0.21	0.10	0.18

Source: Elaborated by the authors, based on the microdata of Pnad 2008 and the PNS 2013.

Initially, the distribution of occupancy categories seems to be slightly different for the depressed public, and occupations of the "superior" category seem to be more representative than when observed the non-depressive public, at least among men. For women, there is a greater proportion of depressives in the category of "manual" occupation. Therefore, performing manual tasks seems to generate positive impact on depression in women, in the case of men the opposite is true.

Regarding to economic activity, greater proportions of depressives are observed in the civil construction and services activities, in the case of men. For women, industry and agriculture have a greater proportion of depressives (always in comparison with the distribution of the non-depressive public).

In the comparison between regions, we can notice the higher incidence of the disease in the residents of the Southeast and South, as well as the inhabitants of the urban area to the detriment of the rural one.

Descriptive statistics also show a difference in the existence of depression according to race, and the proportion of depressive whites and yellows is greater than blacks and browns.

This is what happened with the other variables:

- Education: higher proportion of depressives at higher educational level (for men);
- Working time: greater proportion of depressives in longer journeys;
- Age: higher proportion of depressives in older age groups;
- Income: higher proportion of depressives in higher income brackets;
- Marriage: increased proportion of depressed men when married; Opposite effect for women;
- Head of the family: greater proportion of depressed women when heads of households; Lower proportion in the case of men;
- Chronic disease: increase in the proportion of depressives when they have a chronic disease (greater effect in the PNAD of 2008 compared to the PNS of 2013);
- Violence and child deaths: a greater proportion of depressives when they have suffered some type of violence or lost a child;
- Weight: higher mean weight for depressed people;
- Tobacco and alcohol: higher consumption among depressed people.

Although many relationships can already be evidenced from the descriptive statistics, the econometric model will show us how significant these isolated impacts are, when controlling for all other variables. IN other words, it will show the causal effects between the variables.

RESULTS AND DISCUSSION

The logit results will be represented in terms of odds ratio, where coefficients greater than 1 indicate positive impact, and lower negative impact on the latent variable depression.

Table 4 shows the logit results for the 2008 PNAD database:

Table 4

Logit results in terms of odds ratio, Pnad 2008 **continue**

Logit Results		PNAD 2008					
		Men			Women		
Variable		(1)	(2)	(3)	(1)	(2)	(3)
Depression							
CATOCUP	Medium	0.875	0.857	0.974	0.872*	0.874*	1.081
		(0.098)	(0.065)	(0.767)	(0.027)	(0.029)	(0.338)
	Manual	0.737***	0.735***	0.835*	1.176**	1.132*	1.078
		(0.000)	(0.000)	(0.020)	(0.001)	(0.019)	(0.338)
	Domestic	1.064	1.013	0.934	1.128	1.142*	0.875
		(0.801)	(0.960)	(0.795)	(0.064)	(0.042)	(0.144)

Table 4

Logit results in terms of odds ratio, Pnad 2008 **continue**

Logit Results		PNAD 2008					
		Men			Women		
Variable		(1)	(2)	(3)	(1)	(2)	(3)
Depression							
GDSETOR	Construction		3.194***	2.416**		0.827	1.726
			(0.000)	(0.007)		(0.740)	(0.301)
	Commerce		1.183	1.029		0.697	0.880
			(0.094)	(0.785)		(0.121)	(0.617)
	Services		1.198*	1.096		0.918	1.041
			(0.017)	(0.237)		(0.074)	(0.481)
	Agriculture		1.093	1.071		1.066	1.115
			(0.328)	(0.525)		(0.348)	(0.256)
REG	South			1.389***			1.634***
				(0.000)			(0.000)
	Northeast			0.604***			0.605***
				(0.000)			(0.000)
	North			0.359***			0.421***
				(0.000)			(0.000)
	Midwest			0.905			1.106
				(0.181)			(0.087)
RACE	Blacks and Browns			0.837**			0.849***
				(0.002)			(0.000)
EDU	Basic Incomplete			0.956			1.228**
				(0.613)			(0.004)
	Basic Complete			0.932			1.230*
				(0.554)			(0.018)
	High School incom.			0.865			1.048
				(0.330)			(0.687)
	High School compl.			0.862			1.132
				(0.180)			(0.164)
	Graduation incomp.			0.861			1.005
				(0.345)			(0.968)
	Graduated			0.601***			1.208
				(0.000)			(0.087)
JORNADA	From 26 to 44 hourd			0.651***			0.883**
				(0.000)			(0.006)
	45 hours or more			0.641***			0.944
				(0.000)			(0.278)

Table 4
Logit results in terms of odds ratio, Pnad 2008 **continue**

Logit Results		PNAD 2008					
		Men			Women		
Variable		(1)	(2)	(3)	(1)	(2)	(3)
Depression							
FETAR (age)	Mature I			1.998***			2.429***
				(0.000)			(0.000)
	Mature II			2.440***			2.623***
				(0.000)			(0.000)
	Elderly			1.438*			1.420*
				(0.019)			(0.023)
CATREND (income)	From 1/4 to 1/2 m.w.			0.671*			0.937
				(0.026)			(0.511)
	From 1/2 to 1 m.w.			0.621**			0.781**
				(0.001)			(0.004)
	From 1 to 2 m.w.			0.564***			0.681***
				(0.000)			(0.000)
	From 2 to 3 m.w.			0.534***			0.656***
				(0.000)			(0.000)
	From 3 to 5 m.w.			0.553***			0.577***
				(0.000)			(0.000)
	From 5 to m.w.			0.563***			0.472***
				(0.001)			(0.000)
	More than m.w.			0.672**			0.760**
				(0.009)			(0.004)
CASAD (merried)	Merried			0.686***			0.894*
				(0.000)			(0.035)
NUMFAM (people in the Family)	2-4			0.814			0.803*
				(0.063)			(0.010)
	5-7			0.766*			0.746**
				(0.028)			(0.003)
	8-10			0.486**			0.630*
				(0.009)			(0.020)
	11-14			1			0.564
				(.)			(0.448)
	15 or more			0.259			0.251*
				(0.189)			(0.032)
RESP	Main provider			1.113			1.157**
				(0.129)			(0.003)

Table 4

Logit results in terms of odds ratio, Pnad 2008 **conclusion**

Logit Results		PNAD 2008					
		Men			Women		
Variable		(1)	(2)	(3)	(1)	(2)	(3)
Depression							
URBAN	Urban			1.346***			1.061
				(0.001)			(0.403)
DOENT	Chronic Desease			4.469***			3.633***
				(0.000)			(0.000)
VIOL	Violence			3.806***			3.835***
				(0.000)			(0.000)
DEAD CHILD	Dead child						1.213***
							(0.000)
OBSERVA-TIONS		106.781	106.422	98.311	80.297	80.214	54.975
* P-value in parentheses							

Source: Elaborated by the authors, based on the microdata of Pnad 2008 and the PNS 2013.

Some conclusions can be drawn on the basis of model 3, with all the controls, coming from these results of Pnad (2008), emphasizing that the values reproduced in the Table 4 are of the odds ratios, based on the category of each variable that was omitted:

- Men working in "Manual" occupancies have lower chances of having depression/being diagnosed as depressed in relation to "higher" occupancies;
- Men working in Civil Construction have higher chances of having depression/being diagnosed as depressed in relation to working in Industry;
- Both men and women classified as black or brown have lowers chances of having depression/being diagnosed as depressed;
- Working more hours per week indicates a lower chance of having depression/being diagnosed as depressed;
- The greater the age group the greater the chances of depression, both for women and for men;
- Regarding Income: Compared to people receiving up to ¼ of a minimum wage, all other income brackets reduce the risk of having depression/being diagnosed as depressed. However, this reduction of chances is less evident in the upper income range (of more than 10 minimum wages);
- Being married reduces the chances of having depression/being diagnosed as depressed (for both men and women);
- Family size: it was confirmed that the higher the family, the lower the chances of having depression/being diagnosed as depressed, although not all the coefficients were significant;
- For women, being a household head increases the propensity for having depression/being diagnosed as depressed

- For men, living in urban environments increases the chance of having depression/being diagnosed as depressed;

It is important to highlight that the socioeconomic variables identified as the ones with the greatest explanatory weight in the incidence of depression were:

- The existence of some type of chronic disease has been fundamental in the model: increase the chances of having depression/being diagnosed as depressed for men by about 340% and by 260% for women;
- Suffering from some type of violence was the second variable with the highest odds ratio: 3.8 for both men and women, that is, the chances of developing depression/being diagnosed as depressed are 280% higher for people who are victims of violence;
- And finally, for women, having suffered the death a child was shown of having significant impact increasing the chances of developing depression/being diagnosed as depressed

As seen, table 4 summarized the results of logit models applied to the analysis of the PNAD data. The results of the same *logit* models using the PNS data are shown in Table 5 below.

Table 5

Logit results in terms of odds ratio, PNS 2013 **continue**

Logit Results		PNS 2013					
		MEN			WOMEN		
Variable		(1)	(2)	(3)	(1)	(2)	(3)
Depression							
CATOCUP	Medium	0.624	0.620	0.924	1.441	1.453	1.121
		(0.189)	(0.185)	(0.839)	(0.134)	(0.126)	(0.812)
	Manual	0.508*	0.459*	0.733	1.909**	1.899**	0.996
		(0.047)	(0.022)	(0.492)	(0.004)	(0.004)	(0.993)
	Domestic						
GDSETOR	Construction	1.414	1.455		0.135**	0.362	
		(0.412)	(0.393)		(0.002)	(0.177)	
	Commerce		1.923	1.934		0.659	1.239
			(0.190)	(0.250)		(0.647)	(0.818)
	Services		1.153	0.961		0.997	1.189
			(0.660)	(0.908)		(0.992)	(0.670)
	Agriculture		2.873	2.185		0.0613***	0.0345**
			(0.119)	(0.182)		(0.001)	(0.005)

Table 5

Logit results in terms of odds ratio, PNS 2013 **continue**

Logit Results		PNS 2013					
		MEN			WOMEN		
Variable		(1)	(2)	(3)	(1)	(2)	(3)
Depression							
REG	South			1.061			1.995**
				(0.858)			(0.001)
	Northeast			0.598			0.665
				(0.143)			(0.062)
	North			0.497			0.305***
				(0.086)			(0.000)
	Midwest			0.855			0.980
				(0.641)			(0.927)
RACE	Blacks and Browns			0.699			1.016
				(0.269)			(0.936)
EDU	Basic Incomplete			2.986*			1.697
				(0.018)			(0.071)
	Basic Complete			1.681			1.483
				(0.291)			(0.254)
	High School incom.			0.676			1.719
				(0.588)			(0.212)
	High School compl.			2.482*			1.198
				(0.044)			(0.516)
	Graduation incomp.			2.291			1.357
				(0.189)			(0.505)
	Graduated			4.889**			0.932
				(0.001)			(0.870)
JORNADA	From 26 to 44 hourd			0.956			0.890
				(0.891)			(0.600)
	45 hours or more			1.135			0.633
				(0.714)			(0.149)
FETAR (age)	Mature I			1.759			1.018
				(0.240)			(0.967)
	Mature II			1.705			0.909
				(0.300)			(0.839)
	Elderly			1.691			1
				(0.510)			(.)

Table 5

Logit results in terms of odds ratio, PNS 2013 **continue**

Logit Results		PNS 2013					
		MEN			WOMEN		
Variable		(1)	(2)	(3)	(1)	(2)	(3)
Depression							
CATREND (income)	From 1/4 to 1/2 m.w.			3.817			1.426
				(0.165)			(0.399)
	From 1/2 to 1 m.w.			1.323			1.458
				(0.746)			(0.277)
	From 1 to 2 m.w.			0.990			1.135
				(0.991)			(0.742)
	From 2 to 3 m.w.			1.032			1.041
				(0.971)			(0.936)
	From 3 to 5 m.w.			1.022			1.497
				(0.982)			(0.450)
	From 5 to m.w.			1.102			0.693
				(0.916)			(0.500)
	More than m.w.			0.581			4.684*
				(0.603)			(0.013)
CASAD (merried)	Merried			0.686			1.078
				(0.295)			(0.713)
NUMFAM (people in the Family)	2-4			1.118			0.834
				(0.810)			(0.621)
	5-7			1.633			0.820
				(0.430)			(0.631)
	8-10			0.330			1.004
				(0.350)			(0.997)
	11-14			1			0.123
				(.)			(0.073)
	15 or more			1			1
				(.)			(.)
RESP	Main provider			0.898			1.176
				(0.757)			(0.403)

Table 5

Logit results in terms of odds ratio, PNS 2013 **conclusion**

Logit Results		PNS 2013					
	MEN			WOMEN			
Variable		(1)	(2)	(3)	(1)	(2)	(3)
Depression							
URBAN	Urban			0.653			1.256
				(0.140)			(0.291)
DOENT	Chronic Desease			3.843***			2.519***
				(0.000)			(0.000)
VIOL	Violence			3.324***			1.329
				(0.001)			(0.195)
DEAD CHILD	Dead child						1.515*
							(0.021)
OBSERVA-TIONS		7.029	7.026	6.803	7.597	7.597	4.297
*P-value in parentheses							

Source: Elaborated by the authors, based on the microdata of Pnad 2008 and the PNS 2013

The results shown in table 5 point out:

- As in Pnad, men are less likely to develop depression when they occupy jobs considered as "manual"; but this effect was not significant after the insertion of the control variables, so nothing can be said about the impact of occupation on the development of depression;
- In the category of economic activity, the only significant coefficient indicates the reduction of the chance of having depression for the women of the agriculture in relation to the women of the industry;
- Race: no significant coefficient;
- Schooling: having a complete upper level greatly increases the chances of developing the disease for men, compared to uneducated;
- Having a chronic illness and having suffered violence also had a positive impact on depression, as well as having suffered with the death of a child.
- The coefficients of the other variables were not significant.

CONCLUSIONS

This study sought to evidence the determinants of depression, as a mood disorder, in Brazilian workers, seeking to find evidence pointed out in the literature of work Psychology.

With the *logit* models calculated for Pnad 2008 and for the 2013 PNS, we can outline some conclusions about the proposed theme:

1. The category of occupation revealed through Pnad that manual activity is less impacting in the psychosomatic illness than the "superior" occupation in the case of men, but it was not confirmed in the PNS data;

2. Economic activities revealed that Civil Construction increases the chances of men having depression in relation to work in the industry (according to Pnad data, which were also not confirmed in the PNS);

3. Chronic diseases, violence and death of children were revealed as variables with significant impact on the chances of developing the disease.

To improve the proposed analysis, future research may improve new typologies of occupation and economic activity (mainly opening the large industry sector), differentiating them in terms of healthiness, work condition, type of occupation, level of responsibility, etc. A typology of this approach to worker health could be added to the analysis, given that the categories used could be a reason of the few significant impacts observed in terms of occupation and activity.

This research was based on the understanding that work is a central activity in people's lives and that the quality of the work that we experience is an important factor for our mental health.

Researches from the area of Psychology have already successfully showed relationships of different work contexts with the occurrence of mental illness. The research conclusions presented here reinforce these conclusions from an Economical point of view, and allow us to enrich the understanding of this phenomenon by highlighting socioeconomic variables regarding work conditions applied to large populations that are related to the incidence of depression.

The identification of work contexts and work situations that are more prone to the incidence of depression point to specific places of work that deserve to be studied more thoroughly, so that, in a qualitative way, in the molds characteristic of research based on clinical theories of work, one can understand why the incidence of mental illness is greater in these conditions and cases.

As a final consideration, we emphasize that the study of Mental Health can be greatly enriched by interdisciplinary researches and by the use of plural research methods, promoting a broader and more critical view of the concept of mental health considering the complexity of the subject

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