

**Prevalence of Major Depressive Disorder and association with personal and socio-economic factors. Results for Spain of the European Health Interview Survey 2014-2015.**

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## **ABSTRACT**

**Background:** Depression is a prevalent and most burdensome mental disorder. The objectives of this study are: to assess the prevalence of major depressive disorder in the adult population of Spain; and to analyse its association with personal and socio-economic factors. **Methods:** Data from the European Health Interview Survey in Spain (2014-2015) were analysed (n=21,546). DSM-IV Major Depressive Disorder (MDD) was assessed with the PHQ-8. Personal (age, marital status, and country of birth) and socio-economic (educational level, residence area, employment status and occupational social class) factors were also measured. Prevalence by gender and by personal and socio-economic factors was estimated. Crude (OR) and adjusted (aOR) Odds Ratio and their 95% Confidence Intervals (95%CI) were calculated using logistic regression models. All analyses were stratified by gender. **Results:** Prevalence of MDD was 8.0% (95%CI: 7.3-8.6) among women and 4.1% (95%CI: 3.7-4.6) among men. For both genders, MDD was more prevalent among unemployed and among those in more disadvantaged social classes. Among women only, MDD was more prevalent for those widowed or separated, those with lower educational level, those retired, pre-retired or homemakers and in older ages. Among men only, MDD was more prevalent among those that were born in Spain. **Limitations:** Data are cross-sectional and the sensitivity and specificity of PHQ-8 are not perfect. **Conclusions:** Prevalence of MDD in Spain is high, especially among women, and is strongly associated with personal variables and socio-economic disadvantage. Intersectoral interventions aimed at diminishing the impact of socio-economic disadvantage may help decreasing the societal burden of depression.

**Keywords:** Major Depressive Disorder; Correlates; Epidemiology; Health Survey Studies; Population Studies

## INTRODUCTION

Depressive disorders are amongst the most common mental disorders worldwide, generating great disability and dependence as well as very high economic expenditures for the health systems (Moussavi et al., 2007; Vos et al., 2017). However, geographical variation in the population prevalence of depressive disorders has been reported (Vos et al., 2017; World Health Organization, 2017).

Several studies have assessed the association of personal and socio-economic factors such as gender, employment status and social class with depressive disorders (Calvó-Perxas et al., 2015; Dijkstra-Kersten et al., 2015; Gabilondo et al., 2010; World Health Organization, 2017). Results show that these factors are associated with differences in the prevalence of these disorders. In addition, both the prevalence and the distribution of these factors in the population may vary over time, especially in a period of extreme socio-economic changes such as an economic crisis (Bartoll et al., 2014; Dijkstra-Kersten et al., 2015; Ruiz-Pérez et al., 2017). For instance, in Spain, overall lifetime prevalence estimates of Major Depressive Disorder oscillate between 4% and 10% depending on the year and the context in which the studies were carried out (Calvó-Perxas et al., 2015; Gabilondo et al., 2010). Thus, to target interventions to prevent these disorders and to assess their effectiveness, it is necessary to carry out periodic assessments of the prevalence based on population-representative samples and taking into account their possible socio-economic and personal correlates.

One of the main objectives of Health Surveys is to periodically monitor the health of the population (Instituto Nacional de Estadística, 2015; Kessler et al., 2009). Such monitoring is necessary in order to guide policy and clinical measures to try to prevent both physical and mental diseases. As diagnosis of mental illnesses is based mainly on self-reported symptoms, monitoring them through these surveys could be useful. Such monitoring requires valid, reliable, interpretable and feasible instruments. Different questionnaires to assess mental health have been included in these health surveys (Instituto Nacional de Estadística, 2015; Kessler et al., 2009; Ministerio de

Sanidad y Consumo, 2013), some of which used general tools to assess psychological distress without focusing on specific pathologies. These instruments are suitable to evaluate the general situation of the population's mental health, but not to assess specific pathologies and frame interventions or preventive measures against them. Thus, the use of questionnaires focused on specific pathologies, such as the *Patient Health Questionnaire* (PHQ) for Major Depressive Disorders (Manea et al., 2015), could be better suited to improve the quality of the mental health assessment in health surveys and to provide a framework for guiding preventive measures.

The aims of this study were to: a) estimate the prevalence of major depressive disorder in the adult population of Spain by gender; and b) analyse its association with personal and socio-economic factors.

## **METHODS**

Data from the adults questionnaire and the household questionnaire of the European Health Interview Survey (EHIS) in Spain in 2014-2015 were used (N=22,842). EHIS is a general population survey carried out every 5 years from 2009 in all the countries of the European Union, Switzerland, Iceland and Norway (Eurostat, 2015). Data used for this study are from the second wave of the survey. Its questionnaire includes data on health status, health care use and health determinants. For the Spanish edition of EHIS, a representative sample of the Spanish non-institutionalized adult population (18+ years of age) was selected using a three-stage stratified sampling strategy. Data were collected through face-to-face interviews carried out between January 2014 and January 2015. More detailed information about the survey methodology is available online in the statistical portal of the Ministry of Health, Social Services and Equality of Spain (Instituto Nacional de Estadística, 2015).

For the present study, the following participants were excluded (1,296, 5.7%): those aged less than 18 years old (521, 2.3%), those individuals whose score in the depression screening was impossible to determine (169, 0.7%), and those whose

marital status (20, <0.1%), occupational social class (520, 2.3%) and employment status (66, 0.3%) were unknown. Overall, a total sample of 21,546 participants was considered for the analysis.

Major depressive disorder (MDD) was assessed with the 8-item version of the *Patients Health Questionnaire* (PHQ-8), a questionnaire composed of Likert-type items (from 0 to 3) referring to 8 out of the 9 symptoms included within the Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV) symptom criteria of major depression except thoughts of death or self-harm (Kroenke et al., 2010). The PHQ-8 has shown good reliability and validity in the Spanish population to assess the severity of depressive symptomatology (Diez-Quevedo et al., 2001). A total score is computed by adding each item score, ranging from 0 (none) to 24 (highest) symptoms. The cut-off point for MDD was fixed at 10+, as proposed by the authors of the questionnaire (Kroenke et al., 2009).

Other variables considered in the study were: gender, age, marital status, country of birth (personal); educational level, residence area, employment status and occupational social class based on the current or past work of the main breadwinner of the interviewee's household (socio-economic) (Domingo-Salvany et al., 2013).

A descriptive analysis of the population characteristics was carried out. Gender-stratified prevalence of MDD and comparisons among all other personal and socio-economic variables were estimated together with the corresponding 95% Confidence Interval (CI 95%). To assess the association of personal and socio-economic factors with the prevalence of depression, single variable and multiple logistic regression models were built. Crude Odds Ratios (OR) and adjusted Odds Ratios (aOR) were obtained for each level of the factors included as a separate covariate from these models. The overall statistical significance for each of the variables was calculated using Wald tests. All models were stratified by gender. Multivariable models were adjusted by all personal and socio-economic variables, and their goodness of fit was assessed with the Hosmer and Lemeshow test. Significance tests were made using

two-sided tests evaluated at the 0.05 level of significance. All analyses were carried out taking into account the weights derived from the complex sample design using the Taylor series linearization method, and were made with the statistical software Stata v.14 (StataCorp, 2015).

## **RESULTS**

The prevalence of MDD (Table 1) was 8.0% among women and 4.1% among men. Prevalence of MDD was higher among widowed (women 16.9% and men 6.7%), those with primary or illiterate educational level (women 12.9% and men 6.4%), those unemployed (women 10.2% and men 7.0%), those retired or pre-retired (women 13.8% and men 5.5%) or unable to work due incapacity (women 27.9% and men 26.1%), and those in the most disadvantaged social class (women 12.5% and men 6.7%). A clear negative gradient of MDD prevalence by educational level, by occupational social class and by age was observed.

Multivariable models (Table 2) indicate gender commonalities and differences in the association of MDD with personal and socio-economic factors. For both genders, MDD was significantly associated with unemployment (women aOR=2.59 and men aOR=3.32) and disability to work (women aOR=6.77 and men aOR=13.51) taking employed as reference category, and with belonging to the most disadvantaged social classes (class V: women aOR=1.95 and men aOR=2.34; class VI: women aOR=2.36 and men aOR=3.09) compared to belong to class I. Also, being a student was inversely associated with MDD in both genders (women aOR=0.17 and men aOR=0.22). Among women only, an association of MDD was found with being widowed (aOR=1.93), or separated or divorced (aOR=1.69) considering single as reference category, having a lower educational level (taking university studies as reference: secondary aOR=1.64; primary or illiterate aOR=1.74), being retired/pre-retired (aOR=1.91) or dedicated to household work (aOR= 2.03) considering employed as reference category, and with older ages (taking 18-34 years old as reference: 35-49 years old aOR=1.20; both for

50-64 and >64 years old aOR=1.68). Among men only, an inverse association between being born outside Spain and MDD was found (aOR=0.52).

## **DISCUSSION**

Our study is one of the largest assessing the prevalence of depression in the general Spanish population. Furthermore, the results show that in the Spanish population MDD is twice as much prevalent among women than men, while for both genders, MDD is associated with personal and socio-economic factors, with a higher prevalence among individuals in the most disadvantaged social groups.

The prevalence of MDD found in our study is on the higher bound of previously published estimates for the general population of other European countries (Kessler et al., 2010; Moussavi et al., 2007; World Health Organization, 2017), which are approximately between 2.5% and 7.0% when considering the continent as a whole. Variation in prevalence across European countries, from around 3.0% in Italy to around 7.7% in Hungary (Kessler and Bromet, 2013; Reibling et al., 2017), may be due either to differences in the diagnostic instruments used or to particular characteristics of these populations. General distress questionnaires commonly used in health surveys, might lead to misinterpretations and overestimations of the prevalence of mental health disorders. Given its suitable psychometric properties (Manea et al., 2015), the use of the PHQ may provide lower and more accurate prevalence estimations than general questionnaires (e.g. GHQ-12 between 15% and 20% of psychological distress in the Spanish National Health Survey, not differentiating specific disorders) (Ministerio de Sanidad y Consumo, 2013; Ruiz-Pérez et al., 2017), and could help to establish more accurate comparisons within countries. Besides and always bearing in mind that this tool could not be considered as a gold standard in diagnosis, such as clinical interviews, the PHQ could provide a balance between the length and cost of these interviews and the overestimation and lack of specificity of generic tools.

Taking into account the general determinants of depression, our study shows that MDD is approximately twice as prevalent among women as among men. In addition, gender differences in the factors associated with MDD prevalence were found. While the educational level and marital status are factors related to MDD only among women, the country of birth is only among men. These results are congruent with the results previously reported, indicating the impact of socio-economic factors on mental health varies by gender (Bartoll et al., 2014). Furthermore, these results are clearly consistent with the results previously found (Dijkstra-Kersten et al., 2015; World Health Organization, 2017), and lead us to hypothesize that the reduction of gender inequalities through the adoption of equality policy measures, not necessarily focused on mental health, might reduce the prevalence of MDD and its gender related gap

Regarding specific socio-economic factors, our study shows that MDD is associated with inability to work, unemployment and belonging to disadvantaged social classes. That means that among individuals with depression there is a high representation of people with socio-economic disadvantage. This association is consistent with previous studies and might be related to the current economic crisis affecting all the European countries since 2009, and especially the southern countries (Bartoll et al., 2014; Dijkstra-Kersten et al., 2015; Reibling et al., 2017; Ruiz-Pérez et al., 2017). In addition, our results would suggest that prevention programs specifically targeted to individuals with socioeconomic disadvantage might contribute to reducing the prevalence of depression in the general population. In this sense, prevention programs focused on socio-economic disadvantaged groups might be cost-effective due to the low number that people in this situation represent with respect to the general population.

Some limitations of the study need to be discussed. First, its cross-sectional nature precludes causal interpretation. However, since this study is the starting point for further analyses with new editions of the survey, we consider our design as appropriate in meeting our objectives at the general population level. Second, the

inclusion in the analysis of the people unable to work might have led to some bias due to a possible reverse causality and to the low number of individuals in this situation, which might have rendered unstable estimators in the multivariable models. Nevertheless, its inclusion provides a more accurate representation of the population, and therefore provides higher external validity. Finally, we should highlight the limitations related to the PHQ. The sensitivity and specificity of this questionnaire are not perfect (0.85 and 0.89 respectively for a cut-off point 10+) and consequently a proportion of individuals could be misclassified as false positives (Manea et al., 2012). Besides, its measurement properties in specific clinical populations might not be as suitable as in the general population (Smith et al., 2010). Despite these issues, it should be noted that the PHQ has shown a suitable reliability and validity to detect MDD (whose criteria has not been changed from DSM IV to DSM5) when compared with the diagnosis by a mental health professional, the Composite International Diagnostic Interview-CIDI and the Structured Clinical Interview for DSM-SCID (Diez-Quevedo et al., 2001; Manea et al., 2015). For these reasons, we consider the PHQ as an adequate tool to address the proposed objectives at a general population level, always bearing in mind that the PHQ should be considered as a screening tool.

To conclude, it should be noted that our large study was based on the EHIS 2014-2015, which includes a suitable depression screening tool both for the European and for the Spanish general population, the PHQ (Diez-Quevedo et al., 2001; Kroenke et al., 2009; Manea et al., 2015). We consider that our results may serve as a baseline for possible future comparisons between countries or regions within and outside Europe, as well as for new studies of factors associated with depression in these countries.

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**Table 1. Characteristics of the sample and prevalence of Major Depressive Disorder (PHQ-8), according to gender. European Health Interview Survey in Spain, 2014/2015.**

	Women (n=11,467)		Men (n=10,079)	
	% total (95% CI)	% PHQ≥10 (95% CI)	% Total (95% CI)	% PHQ≥10 (95% CI)
<b>Total</b>	50.8 (50.0-51.6)	8.0 (7.3-8.6)	49.2 (48.4-50.0)	4.1 (3.7-4.6)
<b>Marital status</b>				
Single	21.0 (20.0-21.9)	4.4 (3.4-5.6)	25.9 (24.7-27.1)	3.9 (3.0-5.0)
Married or cohabiting	62.0 (60.9-63.1)	7.2 (6.5-8.1)	68.4 (67.2-69.6)	4.2 (3.6-4.8)
Widowed	11.6 (11.0-12.3)	16.9 (15.0-19.0)	2.5 (2.3-2.8)	6.7 (4.6-9.8)
Separated or divorced	5.5 (5.0-5.9)	11.0 (8.6-14.0)	3.2 (2.9-3.5)	4.0 (2.6-6.2)
<b>Country of birth</b>				
Spain	86.5 (85.4-87.5)	8.2 (7.5-8.9)	88.1 (87.0-89.1)	4.4 (3.9-4.9)
Not Spain	13.5 (12.5-14.6)	6.5 (4.8-8.9)	11.9 (10.9-13.0)	2.3 (1.4-4.0)
<b>Educational level</b>				
University	21.2 (20.1-22.3)	2.9 (2.2-3.7)	18.0 (17.0-19.1)	1.9 (1.3-2.9)
Secondary	46.5 (45.3-47.8)	6.8 (6.0-7.8)	54.5 (53.3-55.8)	3.7 (3.1-4.4)
Primary or Illiterate	32.3 (31.1-33.5)	12.9 (11.6-14.3)	27.5 (26.3-28.7)	6.4 (5.4-7.6)
<b>Residence</b>				
Urban (≥10.000 inhabitants)	80.3 (79.3-81.2)	8.0 (7.3-8.7)	78.1 (77.0-79.2)	4.1 (3.6-4.7)
Rural (<10.000 inhabitants)	19.7 (18.8-20.7)	7.9 (6.7-9.3)	21.9 (20.8-23.0)	4.1 (3.2-5.3)
<b>Working status</b>				
Employed	40.9 (39.7-42.1)	3.7 (3.0-4.5)	53.5 (52.2-54.8)	2.0 (1.6-2.5)
Unemployed	15.4 (14.5-16.4)	10.2 (8.5-12.3)	15.9 (15.0-16.9)	7.0 (5.5-8.8)

Retired/pre-retired	19.5 (18.7-20.3)	13.8 (12.4-15.4)	22.3 (21.4-23.2)	5.5 (4.5-6.5)
Studying	5.5 (4.9-6.1)	0.5 (0.0-2.2)	5.2 (4.6-5.9)	0.4 (0.1-1.3)
Unable to work	1.6 (1.3-1.9)	27.9 (20.7-36.3)	2.8 (2.4-3.2)	26.1 (20.0-33.2)
Homemaker	17.2 (16.3-18.1)	10.0 (8.4-11.7)	0.3 (0.2-0.5)	2.1 (0.4-9.9)
<b>Occupational social class</b>				
I	10.9 (10.1-11.8)	3.2 (2.2-4.6)	11.6 (10.7-12.5)	1.5 (0.9-2.4)
II	8.5 (7.9-9.1)	5.4 (3.9-7.4)	8.1 (7.5-8.8)	2.7 (1.7-4.2)
III	19.2 (18.3-20.2)	5.9 (4.8-7.1)	19.0 (18.0-19.9)	3.0 (2.2-4.1)
IV	14.1 (13.3-14.9)	6.9 (5.7-8.4)	15.4 (14.5-16.3)	3.8 (2.8-5.2)
V	32.1 (30.9-33.3)	9.8 (8.7-11.0)	32.9 (31.6-34.2)	5.2 (4.3-6.2)
VI	15.3 (14.3-16.3)	12.5 (10.6-14.7)	13.1 (12.2-14.1)	6.7 (5.2-8.7)
<b>Age in years</b>				
18-34 years old	23.4 (22.3-24.5)	3.8 (2.9-5.0)	24.9 (23.8-26.1)	2.8 (2.0-4.0)
35-49 years old	30.0 (28.9-31.1)	5.6 (4.7-6.7)	32.1 (30.9-33.2)	3.3 (2.7-4.1)
50-64 years old	23.3 (22.3-24.3)	9.9 (8.5-11.4)	23.5 (22.5-24.5)	5.4 (4.4-6.6)
>64 years old	23.3 (22.4-24.2)	13.2 (12.0-14.7)	19.6 (18.7-20.4)	5.6 (4.7-6.8)
Occupational social class: I (managers >10 workers), II (managers <10 workers), III (intermediary and self-employment), IV (supervisors, qualified), V (primary sector, semi-qualified), VI (non-qualified)				
All percentages were calculated taking into account the weights derived from the complex sampling method				

**Table 2. Association of personal and socioeconomic characteristics and Major Depressive Disorder (PHQ-8). Single variable and multiple logistic regression models stratified by gender. European Health Interview Survey in Spain, 2014/2015.**

	Models (Women)				Models (Men)			
	OR (IC95%)	p value	ORa (IC95%)	p value	OR (IC95%)	p value	ORa (IC95%)	p value
<b>Marital status</b>		<0.001		<0.001		0.326		0.355
Single	1.00		1.00		1.00		1.00	
Married or cohabiting	1.71 (1.29-2.27)		1.10 (0.82-1.49)		1.08 (0.80-1.46)		1.08 (0.78-1.48)	
Widowed	4.48 (3.35-5.99)		1.93 (1.37-2.71)		1.80 (1.11-2.91)		1.21 (0.78-2.08)	
Separated or divorced	2.72 (1.89-3.91)		1.69 (1.16-2.47)		1.04 (0.61-1.67)		0.80 (0.47-1.36)	
<b>Country of birth</b>		0.160		0.485		0.024		0.038
Spain	1.00		1.00		1.00		1.00	
Not Spain	0.78 (0.55-1.10)		0.92 (0.64-1.31)		0.52 (0.30-0.92)		0.52 (0.29-0.92)	
<b>Educational level</b>		<0.001		0.005		<0.001		0.705
University	1.00		1.00		1.00		1.00	
Secondary	2.48 (1.83-3.37)		1.64 (1.16-2.31)		2.00 (1.26-3.15)		1.23 (0.71-2.14)	
Primary or Illiterate	5.02 (3.76-6.70)		1.74 (1.19-2.56)		3.53 (2.24-5.55)		1.23 (0.67-2.24)	
<b>Residence</b>		0.920		0.063		0.980		0.199
Urban (≥10.000 inhabitants)	1.00		1.00		1.00		1.00	
Rural (<10.000 inhabitants)	0.99 (0.81-1.22)		0.82 (0.66-1.01)		1.00 (0.76-1.33)		0.81 (0.60-1.08)	
<b>Working status</b>		<0.001		0.001		<0.001		<0.001
Employed	1.00		1.00		1.00		1.00	
Unemployed	2.98 (2.23-3.98)		2.59 (1.92-3.51)		3.73 (2.65-5.25)		3.32 (2.35-4.69)	
Retired/pre-retired	4.20 (3.29-5.35)		1.91 (1.31-2.82)		2.88 (2.13-3.89)		1.68 (0.93-3.03)	
Studying	0.12 (0.03-0.60)		0.17 (0.03-0.83)		0.21 (0.06-0.67)		0.22 (0.06-0.77)	
Unable to work	10.10 (6.52-15.63)		6.77 (4.33-10.58)		17.56 (11.62-26.53)		13.51 (8.67-21.03)	
Homemaker	2.89 (2.20-3.80)		2.03 (1.47-2.5)		1.05 (0.20-5.54)		0.82 (0.15-4.65)	
<b>Occupational social class</b>		<0.001		<0.001		<0.001		<0.001
I	1.00		1.00		1.00		1.00	
II	1.72 (1.05-2.82)		1.52 (0.92-2.51)		1.83 (0.92-3.61)		1.62 (0.81-3.26)	
III	1.87 (1.22-2.87)		1.34 (0.85-2.11)		2.09 (1.16-3.76)		1.64 (0.83-3.23)	
IV	2.23 (1.45-3.42)		1.36 (0.85-2.19)		2.68 (1.49-4.83)		1.74 (0.87-3.47)	
V	3.25 (2.20-4.81)		1.95 (1.26-3.02)		3.67 (2.18-6.19)		2.34 (1.22-4.49)	
VI	4.28 (2.81-6.53)		2.36 (1.48-3.78)		4.84 (2.75-8.51)		3.09 (1.54-6.21)	
<b>Age</b>		<0.001		<0.001		<0.001		0.253
18-34 years old	1.00		1.00		1.00		1.00	
35-49 years old	1.52 (1.08-2.12)		1.20 (0.86-1.68)		1.18 (0.77-1.81)		1.04 (0.66-1.22)	
50-64 years old	2.78 (2.00-3.87)		1.68 (1.19-2.37)		1.96 (1.28-3.00)		1.28 (0.79-2.08)	
>64 years old	3.88 (2.85-5.28)		1.68 (1.10-2.57)		2.06 (1.37-3.09)		1.68 (0.82-3.45)	

OR: crude Odds Ratio; ORa: Odds Ratio adjusted by all personal and socio-economic variables.

p value: values obtained from Wald test

Occupational social class: I (managers >10 workers), II (managers <10 workers), III (intermediary and self-employ), IV (supervisors, qualified), V (primary sector, semi-qualified), VI (non-qualified)

All models were built taking into account the weights derived from the complex sampling method.

All multivariable models had a p-value>0.05 in the Hosmer and Lemeshow Test.

