

Factors associated with depressive disorder among Peruvian older adults

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The present study is part of a research work written by Juan Carlos Torres Mantilla to earn the *título profesional de médico cirujano* (Doctor of Medicine degree). Title: *Factores asociados al trastorno depresivo en adultos mayores peruanos registrados en la Encuesta Demográfica y de Salud Familiar 2019* (Factors associated with depressive disorder among Peruvian older adults registered in the 2019 National Demographic and Family Health Survey) [undergraduate thesis]. Lima: School of Human Medicine, Universidad Privada San Juan Bautista; 2022.

ABSTRACT

Objective: To determine the prevalence and factors associated with depressive disorder among Peruvian older adults over 60 years of age.

Materials and methods: An observational, analytical and cross-sectional study was conducted based on a secondary analysis of the 2019 Encuesta Demográfica y de Salud Familiar (ENDES - National Demographic and Family Health Survey), administered at national level by Instituto Nacional de Estadística e Informática del Perú (INEI - National Institute of Statistics and Informatics of Peru). The sample consisted of 4,174 older adults. The main variable was suffering from a depressive disorder (depressed/not depressed) and the independent variables were age, sex, educational level, wealth quintile (classified into five levels of wealth), area of residence (classified as urban/rural), geographic domain (classified as Lima Metropolitan Area, the rest of the coast, the highlands and the jungle), health coverage (classified as insured/uninsured), alcohol consumption (yes/no), smoking (yes/no) and presence of a disability (yes/no). Analyses of absolute and relative frequencies, differences in proportions and a multivariate analysis using generalized linear models (GLM) were performed.

Results: The prevalence of depressive disorder and disability accounted for 13.18 % and 7.86 %, respectively. Older males were less likely to suffer from a depressive disorder (PRa = 0.602; 95 % CI: 0.513-0.706) than females, and the group over 85 years of age showed a higher risk than those from 60 to 74 years (PRa = 1.664; 95 % CI: 1.304-2.124). Besides, not presenting a disability behaved as a preventive factor (PRa = 0.542; 95 % CI: 0.440-0.668), while a higher educational level and wealth quintile, starting from the "Middle" quintile, were protective factors when taking the categories "No education" and "The poorest" as reference, respectively ($p < 0.005$).

Conclusions: Belonging to the group over 85 years of age, being a female, being in lower wealth quintiles, suffering from a disability and having a lower educational level were risk factors for depressive disorder among Peruvians older adults.

Keywords: Depression; Aged; Mental Health; Public Health; Peru (Source: MeSH NLM).

Factores asociados al trastorno depresivo en adultos mayores peruanos

El presente estudio forma parte del trabajo de investigación para obtener el título profesional de médico cirujano de Juan Carlos Torres Mantilla. Factores asociados al trastorno depresivo en adultos mayores peruanos registrados en la Encuesta Demográfica y de Salud Familiar 2019 [Tesis de pregrado]. Lima: Facultad de Medicina Humana, Universidad Privada San Juan Bautista; 2021.

RESUMEN

Objetivo: Determinar la prevalencia y los factores asociados con el trastorno depresivo en adultos peruanos mayores de 60 años.

Materiales y métodos: Se realizó un estudio observacional, analítico y transversal a partir de un análisis secundario de la Encuesta Demográfica y de Salud Familiar (ENDES) del año 2019, aplicada con un alcance nacional por el Instituto Nacional

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de Estadística e Informática del Perú (INEI). La muestra fue de 4174 adultos mayores. Se consideró como variable principal el padecer de trastorno depresivo (con depresión/sin depresión) y como variables independientes, edad, sexo, grado de instrucción, quintil de riqueza (clasificado en cinco niveles de riqueza), área de residencia (clasificada como urbano y rural), dominio geográfico (clasificado como Lima Metropolitana, resto de la Costa, Sierra y Selva), cobertura de salud (clasificada como sin cobertura y con cobertura), consumo de alcohol (sí/no), hábito de fumar (sí/no) y presencia de discapacidad (sí/no). Se realizaron análisis de frecuencias absolutas y relativas, diferencias de proporciones y un análisis multivariado mediante modelos lineales generalizados.

Resultados: La prevalencia del trastorno depresivo fue del 13,18 % y de la discapacidad, 7,86 %. Los adultos mayores de sexo masculino tuvieron menos probabilidades de padecer trastorno depresivo (RPa = 0,602; IC 95 %: 0,513-0,706) que las mujeres, así como los integrantes del grupo etario de mayores de 85 años presentaron mayor riesgo que los de 60 a 74 (RPa = 1,664; IC 95 %: 1,304-2,124). Además, el no padecer de alguna discapacidad se comportó como un factor preventivo (RPa = 0,542; IC 95 %: 0,440-0,668), mientras que un mayor grado de instrucción y quintil de riqueza, desde el quintil “medio”, indicaron también ser factores de protección al tomarse como referencia las categorías “sin educación” y “los más pobres”, respectivamente ($p < 0,005$).

Conclusiones: El pertenecer al grupo de mayores de 85 años, del sexo femenino, de bajos quintiles de riqueza, padecer de alguna discapacidad y tener un menor grado de instrucción constituyen factores de riesgo para el trastorno depresivo en adultos mayores peruanos.

Palabras clave: Depresión; Adulto Mayor; Salud Mental; Salud Pública; Perú (Fuente: DeCS BIREME).

INTRODUCTION

According to estimates of the World Health Organization (WHO), adults over 60 years of age are the fastest growing age group, to the point that they currently outnumber all children under five and, by the year 2050, they are projected to outnumber people aged between 15 and 24⁽¹⁾. These data indicate significant changes in the distribution of population groups and in global demographic dynamics due to increased longevity^(1,2).

In 2015, the United Nations (UN) reported that, in Latin America and the Caribbean, 11 % of the population was over 60 years of age and that, within 35 years, one out of every four people will belong to that age group⁽³⁾. Consequently, in Peru, the Instituto Nacional de Estadística e Informática del Perú (INEI - National Institute of Statistics and Informatics of Peru) has estimated an average annual growth rate of 4.9 % for the last 10 years so that, by 2050, one out of every five people will belong to the group of older adults⁽⁴⁾.

Together with population aging, depressive disorder in old age is a serious risk of overburdening the health care system, social security and the economy, in addition to affecting individual well-being⁽⁵⁻⁷⁾, especially considering that depression is one of the most common mental illnesses in this age group and is related to the development and unfavorable prognosis of other chronic diseases⁽⁸⁻¹⁰⁾. This is why a better understanding of depressive disorder in old age is important from a clinical and public health perspective.

Current evidence demonstrates a relationship between disability and mental health, including an increased risk of depression⁽⁹⁻¹²⁾. However, not only pathophysiology and related mechanisms are not yet fully understood, but other factors may influence this relationship⁽¹³⁻²⁰⁾, as established by the WHO Commission on Social Determinants of Health (CSDH) that addresses the reasons that may lead to avoidable health inequities⁽²¹⁾. Several studies have related sociodemographic aspects to depressive disorder among older adults and found variations according to the distinctive features of each society⁽¹⁵⁻¹⁹⁾.

In Peru, the population aged 60 years and older accounted for the highest percentage of people with a disability between 2000 and 2019⁽²²⁾, while the trend of depressive disorder increased after age 75⁽²³⁾. Moreover, Peru ranked third in the Americas in the classification of disability due to depression, with 8.6 %, which exceeds the regional average of 7.8 %⁽²⁴⁾. These data indicate not only the potential impact of neglecting depressive disorder and its relationship with disability in the health system and the quality of life of Peruvians but also the importance of improving the understanding of the limitations of the older adult population for the eventual development of more efficient public health policies.

Given the evidence suggesting a variable influence of the sociodemographic factors of depressive disorder, according to the distinctive features of each population, as well as an association between physical disability, general comorbidities and depression in populations over 60 years of age, the present study aimed to identify the prevalence and factors associated with depressive disorder among

older adults based on data recorded in the 2019 Encuesta Demográfica y de Salud Familiar (ENDES - Demographic and Family Health Survey).

MATERIALS AND METHODS

Study design and population

An observational, analytical and cross-sectional study was conducted based on a secondary analysis of data obtained from the ENDES, administered at the national level by the INEI (National Institute of Statistics and Informatics of Perú) during 2019. The ENDES collects updated information on aspects of the Peruvian population—such as demographic dynamics and factors associated with health status—through household interviews performed in representative national samples. It is a two-stage, probability, balanced, stratified and independent sample survey carried out at the departmental level and by urban and rural area, which uses households as the sampling unit and household residents as the analysis unit. The sample for 2019 was comprised of 36,760 households. The population consisted of all adults over 60 years of age (5,235) registered in the 2019 ENDES health questionnaire (CSALUD1), out of whom a sample of 4,174 older adults was selected. Said sample only included people who had complete data of all the variables evaluated in the present research (Figure 1).

Variables and measurements

The dependent variable was the diagnosis of depression in adults over 60 years of age, dichotomized (depressed/not depressed) from questions QS700A to QS700I of the Mental Health Questionnaire for persons aged 15 years or older, concerning the presence of mood disturbances or problems; while the independent variables were age, sex, educational level, wealth quintile (classified into five levels of wealth), area of residence (classified as urban/rural), geographic region (classified as Lima Metropolitan Area, the rest of the coast, the highlands and the jungle), health coverage (classified as insured/uninsured), alcohol consumption (yes/no), smoking (yes/no) and presence of disability (yes/no).

For the variable depressive disorder, the 2019 ENDES recorded the scores from the Patient Health Questionnaire-9 (PHQ-9), which is a psychometric tool for screening depression that consists of nine subquestions and covers the criteria established in the fifth edition of the Diagnostic

and Statistical Manual of Mental Disorders (DSM-5). This instrument has been validated for Peru by means of a factor analysis and measurement invariance (MI), through the standard and multigroup confirmatory factor analysis (CFA), respectively ⁽²⁵⁾. It was also validated by expert judgment of the Dirección de Salud Mental (Mental Health Directorate) of the Ministry of Health in coordination with the Instituto Nacional de Salud (INS - National Institute of Health) ⁽²⁶⁾. Following this validation, the variable was dichotomized with depressed if the final score was equal to or greater than 10, and not depressed if the final score was less than 10.

The codes of the RECH1 database were used for the variables age, sex and educational level; the RECH23 database for the variables wealth quintile and geographic region; the RECH0 database for the variable area of residence; and the CSALUD01 database for the variables health coverage, smoking and alcohol consumption. The variable disability was dichotomized using the codes of the CSALUD01 database (Figure 1). The characterization and coding of the variables are found in the health dictionaries of the Health Survey, Household Characteristics and Housing Characteristics modules of the 2019 ENDES (inei.gob.pe).

Statistical analysis

A database was exported to the Microsoft Excel program with the information of the study variables, according to the 2019 ENDES indicators. The data were tabulated in a spreadsheet used as a data collection sheet and analyzed with IBM SPSS Statistics V25. The following was employed: absolute and relative frequencies for the descriptive analysis; an analysis of difference in proportions by means of the chi-square test, with a p value < 0.05 , to evaluate the association of the variables with the diagnosis of depression; and to determine their correlation, the generalized Poisson regression models through the log link function and robust variance estimates in a crude and adjusted model, with 95 % confidence intervals and a p value < 0.05 which was considered statistically significant.

Ethical considerations

The present research did not require the approval of an ethics committee, consents or additional permissions, since it analyzed a public domain database that does not allow the identification of the participants and is available on the INEI website (<http://inei.gob.pe/microdatos/>).

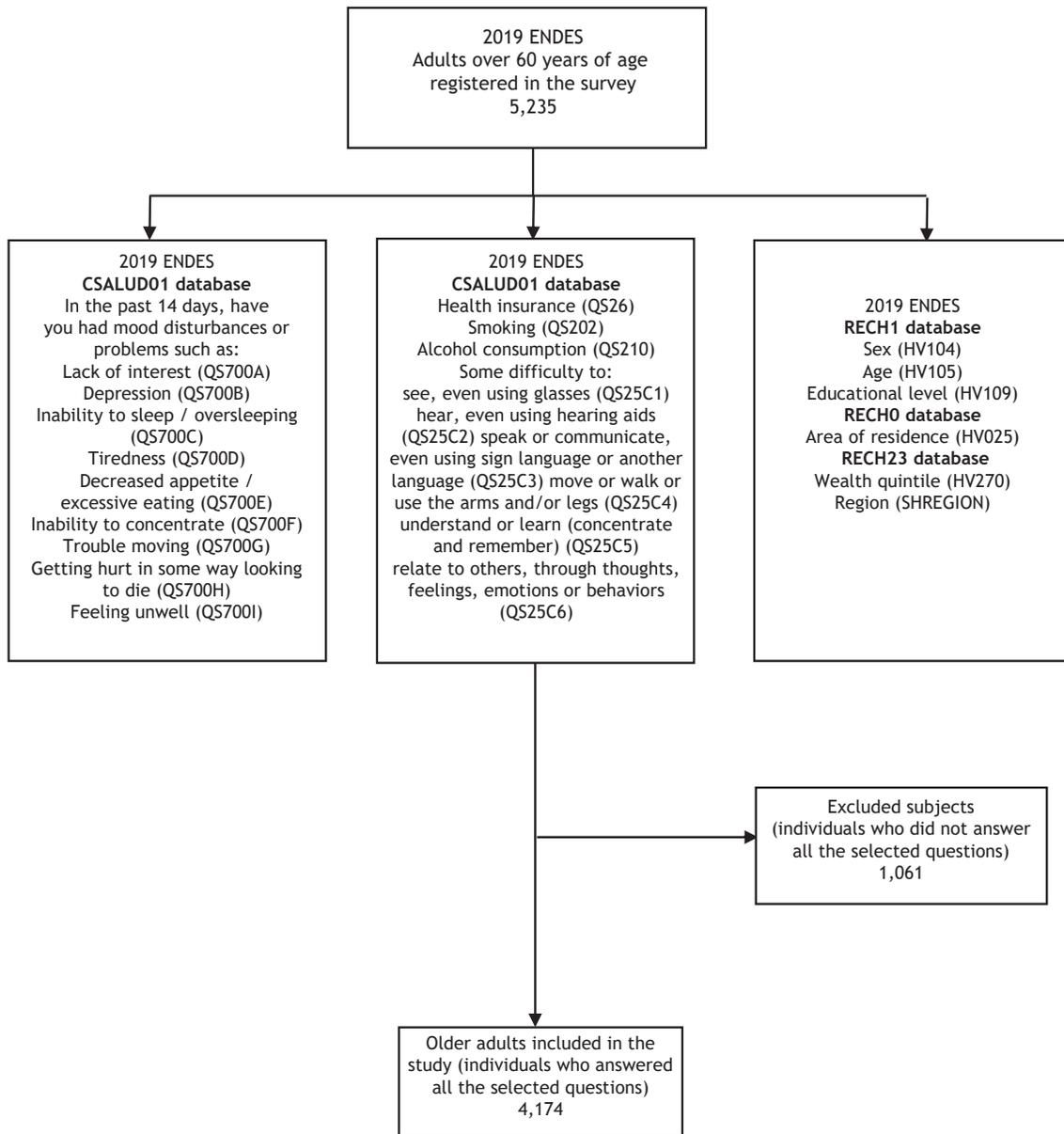


Figure 1. Flowchart of the screening of adults over 60 years of age included in the study. 2019 ENDES

RESULTS

The present study included a total of 4,174 older adults, out of whom 13.18 % had depressive disorder and 7.86 % suffered from a disability. Likewise, 53.33 % of the older adults were males, 74.79 % were in the 60-74 age group, 59.82 % had primary education, 83.87 % had health coverage, 41 % belonged to the geographic region of the highlands, 36.37 % were registered in “The poorest” wealth quintile and 60.57 % lived in the urban area. Moreover, a prevalence of 1.94 % was identified for smoking and 22.88 % for alcohol consumption (Table 1).

Factors associated with depressive disorder
among Peruvian older adults

Table 1. General characteristics of older adults under study

Variable			
Sociodemographic characteristics		<i>n</i>	%
Sex	Male	2,226	53.33
	Female	1,948	46.67
Age	≥ 85 years	217	5.19
	75-84 years	836	20.02
	60-74 years	3,121	74.79
Educational level	University higher education	404	9.67
	Non-university higher education	288	6.89
	Secondary education	931	22.30
	Primary education	2,497	59.82
	No education	54	1.32
Health coverage	Yes	3,501	83.87
	No	673	16.13
Geographic region	Highlands	1,713	41.0
	Jungle	742	17.77
	The rest of the coast	1,192	28.55
	Lima Metropolitan Area	527	12.68
Wealth quintile	The richest	611	14.64
	Rich	601	14.40
	Middle	664	15.90
	Poor	780	18.69
	The poorest	1,518	36.37
Area of residence	Rural	1,646	39.43
	Urban	2,528	60.57
Bad habits			
Smoking	No	4,093	98.06
	Yes	81	1.94
Alcohol consumption	No	3,219	77.12
	Yes	955	22.88
Disability	No	3,846	92.14
	Yes	328	7.86
Depressive disorder	No	3,624	86.82
	Yes	550	13.18

The analysis of the prevalence according to the study variables showed that depressive disorder was more frequent among female older adults ($p = 0.000$), those belonging to the age group over 85 years ($p = 0.000$), people with no education ($p = 0.000$), those having joined a health system (0.010 %), those belonging to the geographic region of the highlands ($p = 0.000$), those registered in the “The poorest” wealth quintile ($p = 0.000$), those living in rural areas ($p = 0.000$) and those suffering from a disability ($p = 0.000$). As for bad habits, alcohol consumption showed a statistically significant difference ($p = 0.001$), while smoking did not ($p = 0.375$) (Table 2).

Table 2. Risk factors associated with depressive disorder among older adults

Variable		Depressive disorder in Peruvian older adults		
		Not depressed	Depressed	<i>p</i>
Sex	Female	1,636	312	0.000
		84.0 %	16.0 %	
	Male	1,988	238	
		89.30 %	10.70 %	
Age	60-74 years	2,761	360	0.000
		88.47 %	11.53 %	
	75-84 years	703	133	
		84.10 %	15.90 %	
≥ 85 years	160	57		
	73.73 %	26.27 %		
Educational level	No education	33	21	0.000
		61.11 %	38.99 %	
	Primary education	2,092	405	
		83.78 %	16.22 %	
	Secondary education	852	79	
		91.51 %	8.49 %	
Non-university higher education	264	24		
	91.67 %	8.33 %		
University higher education	383	21		
	94.80 %	5.20 %		
Health coverage	No	605	68	0.010
		89.90 %	10.10 %	
	Yes	3,019	482	
		86.23 %	13.77 %	
Geographic region	Lima Metropolitan Area	481	46	0.000
		91.27 %	8.73 %	
	The rest of the coast	1,094	98	
		91.77 %	8.23 %	
Jungle	654	88		
	88.14 %	11.86 %		
Highlands	1,395	318		
	81.44 %	18.56 %		
Wealth quintile	The poorest	1,225	293	0.000
		80.70 %	19.30 %	
	Poor	673	107	
		86.28 %	13.72 %	
	Middle	597	67	
		89.90 %	10.10 %	
Rich	561	40		
	93.34 %	6.66 %		
The richest	568	43		
	92.96 %	7.04 %		

Factors associated with depressive disorder
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Variable		Depressive disorder in Peruvian older adults		
		Not depressed	Depressed	<i>p</i>
Area of residence	Urban	2,281	247	0.000
		90.22 %	9.78 %	
	Rural	1,343	303	
		81.59 %	18.41 %	
Smoking	Yes	73	8	0.375
		90.12 %	9.88 %	
	No	3,551	542	
		86.75 %	13.25 %	
Alcohol consumption	Yes	860	95	0.001
		90.05 %	9.95 %	
	No	2,764	455	
		85.86 %	14.14 %	
Disability	Yes	240	88	0.000
		73.17 %	26.83 %	
	No	3,384	462	
		87.99 %	12.01 %	

Using the analysis for the calculation of prevalence ratios (PR), the crude model showed an association between depressive disorder and all variables, with the exception of belonging to the geographic region of the jungle ($p = 0.076$) and the rest of the coast ($p = 0.726$) with respect to Lima Metropolitan Area, as well as smoking ($p = 0.386$). However, in the adjusted model, there was no association between belonging to the 75-84 age group with respect to the 60-74 age group ($p = 0.085$), having joined a health insurance plan ($p = 0.151$), belonging to the geographic region of the highlands compared to Lima Metropolitan Area ($p = 0.202$), belonging to the “Poor” quintile with respect to “The poorest” quintile ($p = 0.146$), living in the urban area versus the rural area ($p = 0.604$) and no alcohol consumption ($p = 0.435$) (Table 3).

Older males were less likely to suffer from a depressive disorder (aPR = 0.602; 95 % CI: 0.513-0.706) than females, and the group over 85 years of age showed a higher risk than those from 60 to 74 years (aPR = 1.664; 95 % CI: 1.304-2.124). Besides, not presenting a disability behaved as a preventive factor (aPR = 0.542; 95 % CI: 0.440-0.668), while the variables educational level and wealth quintile, starting from the “Middle” quintile, were protective factors when taking the categories “No education” and “The poorest” as reference ($p < 0.005$), respectively (Table 3).

Table 3. Estimation of Peruvian older adults in relation to the diagnosis of depression

Variable	Factors associated with depressive disorder among Peruvian older adults					
	Crude model			Adjusted model		
	PR	95 % CI	p value	PR	95 % CI	p value
Sex						
Female	Ref			Ref		
Male	0.668	0.570-0.781	0.000	0.602	0.513-0.706	0.000
Age						
60-74 years	Ref			Ref		
75-84 years	1.379	1.148-1.657	0.001	1.176	0.978-1.415	0.085
≥ 85 years	2.277	1.786-2.904	0.000	1.664	1.304-2.124	0.000
Educational level						
No education	Ref			Ref		
Primary education	0.417	0.295-0.590	0.000	0.609	0.428-0.867	0.006
Secondary education	0.218	0.147-0.324	0.000	0.480	0.313-0.737	0.001
Non-university higher education	0.214	0.129-0.356	0.000	0.515	0.296-0.896	0.019
University higher education	0.134	0.078-0.228	0.000	0.351	0.191-0.644	0.001
Health coverage						
No	Ref			Ref		
Yes	1.363	1.072-1.732	0.012	1.191	0.938-1.511	0.151
Geographic region						
Lima Metropolitan Area	Ref			Ref		
The rest of the coast	0.942	0.674-1.317	0.726	0.754	0.537-1.060	0.104
Jungle	1.359	0.968-1.906	0.076	0.899	0.621-1.303	0.575
Highlands	2.127	1.586-2.852	0.000	1.254	0.886-1.774	0.202
Wealth quintile						
The poorest	Ref			Ref		
Poor	0.711	0.580-0.871	0.001	0.839	0.663-1.063	0.146
Middle	0.523	0.407-0.671	0.000	0.680	0.488-0.947	0.022
Rich	0.345	0.251-0.473	0.000	0.472	0.313-0.711	0.000
The richest	0.365	0.288-0.495	0.000	0.548	0.349-0.860	0.009
Area of residence						
Urban	Ref			Ref		
Rural	1.884	1.612-2.202	0.000	0.939	0.740-1.191	0.604
Smoking						
Yes	Ref			Ref		
No	1.341	0.691-2.601	0.386	0.864	0.457-1.636	0.655
Alcohol consumption						
Yes	Ref			Ref		
No	1.421	1.153-1.751	0.001	1.088	0.881-1.343	0.435
Disability						
Yes	Ref			Ref		
No	0.448	0.367-0.546	0.000	0.542	0.440-0.668	0.000

DISCUSSION

According to the research results, the prevalence of depressive disorder among older adults accounted for 13.18 %, which suggests a reduction compared to previous years^(9,10). This decrease could be due to the implementation of mental health strategies, mainly the implementation of community mental health centers⁽⁶⁾. Likewise, the distribution of the older adult population follows the parameters of the region, which shows an international demographic aging pattern⁽¹⁻⁴⁾.

Similarly, the correlation between depressive disorder among older adults and gender is consistent with that of previous studies, in which female sex is a risk factor⁽⁸⁻¹⁵⁾. It is noteworthy that in studies carried out in the Peruvian older adult population^(9,10), as well as in other Latin American countries⁽⁸⁾, depressive disorder is more correlated with females than with males. Likewise, Richardson, et al.⁽¹⁵⁾ recorded the female sex as a risk factor for depressive disorder among older adults from 18 different countries in Asia, Europe and America. According to the available evidence, this susceptibility could be due not to biological factors but to determining factors derived from gender roles that predispose females to express and acknowledge their emotions more openly than males; to develop a lower capacity to accumulate wealth and receive education and an income than males; to have a more fragmented career path; to experience the loss of a spouse, loneliness, social isolation, disability and economic hardship. These factors would lead, toward the end of life, to live in environments where rates of psychological distress are high^(13,14). Even so, adjusted correlation models indicate that, beyond gender per se, there are sociodemographic aspects that may condition the prevalence of depressive disorder and act as protective factors for female older adults.

The risk factor for those over 85 years of age is an indicator likely to increase. Although this age group currently accounts for a minority percentage, given the demographic dynamics of aging in the country, it is possible that its number will increase exponentially each year⁽³⁾. A total of 26.27 % of older adults in this age range had depressive disorder, which is more than double the percentage of the reference group and suggests that, in an eventual increase, the prevalence of depressive disorder will also increase, as recorded in other populations where life expectancy increased⁽¹²⁾.

On the other hand, the behavior of the educational level and wealth quintile as protective factors implies the influence of situations beyond the scope of health care on the state of mental health. Thus, although recent public health strategies have included with special emphasis the treatment and prevention of the most prevalent diseases in the framework of mental health^(6,7), the results of the

present research show that joining a health insurance plan is neither a significant factor nor a preventive factor for depressive disorder, even more if it is considered that 83.87 % of the older adults had health coverage. The magnitude of insured older adults shows that the care provided for the treatment and prevention of depressive disorder is not achieving the desired impact, although the multifactorial nature of the problem makes it difficult to predict the effect that mental health services, by themselves, can achieve^(15,27).

In this sense, an association between unfavorable socioeconomic conditions and 1.8 more probabilities of suffering from depression, compared to groups in better conditions, has been found. This same pattern is reflected in research studies conducted in different populations⁽¹⁵⁻¹⁹⁾. Even so, the various correlations may be due to cultural differences between countries. Freeman et al.⁽¹⁶⁾ found an incidence of depressive disorder of 9 % in Spain in the context of a national financial crisis and an unemployment rate twice that of Poland and Finland, where the incidence of depressive disorder accounted for 4 %. Despite this, they found no association between income levels and depressive disorder in Spain, in contrast to Poland and Finland. Likewise, Ettman et al.⁽¹⁸⁾ determined that the inverse relationship between income levels and depression will depend on macroeconomic events that condition the social dynamics in each country, so that a condition such as the increase in real estate prices will have a greater negative impact on the mental health of older adults living in cities where there is a greater lack of access to housing.

Concerning the Peruvian situation, the data reported by the INEI could offer an approach to the conditions of this age group. According to 2021 statistics, 83 % and 70 % of the female and male older adult population, respectively, have some chronic health problem; 53 % of older adults are economically active; 25.9 % of Peruvian households are headed by an older adult (out of whom 16.2 % have joined a social welfare program); and 92.2 %, 74.5 % and 95.2 % have access to public water supply, public sewage and electricity, respectively⁽⁴⁾. These indicators cover the basic needs related to economic stability, which could explain why out of all the factors evaluated, the wealth quintile showed the highest correlation. Even when considering the high incidence of chronic diseases, the total percentage of depressive disorder was only 13.18 % (Table 1). A decreased risk of depression was found for older adults belonging to higher wealth quintiles; on the other hand, there was no correlation with factors such as bad habits, health coverage and area of residence (Table 3). This suggests that the socioeconomic factor has even a greater impact than chronic conditions; likewise, the educational level acts as a protective factor, which can be associated with a better understanding of the stage of life and a greater probability of increasing socioeconomic well-being^(17,19). These criteria

highlight the importance of strengthening the indicators of economic well-being and education in the general Peruvian population.

It is also important to note that alcohol consumption and smoking were not risk factors for depressive disorder, unlike suffering a disability. This may be due to the constant global policies to break bad habits⁽²⁸⁻³⁰⁾ and the decreased general activity associated with older age^(5,13,19), which are reflected in the descriptive statistics of the present study, which recorded a prevalence of 1.94 % and 22.88 % for smoking and alcohol consumption, respectively. On the other hand, although not suffering a disability is a protective factor (aPR: 0.542; 95 % CI: 0.440-0.668), such result could be attributed to the fact that the prevalence of disability found among older adults was 7.86 %. Even so, there is sufficient evidence to establish a relationship between depression and disability. Disability itself is an independent determining factor of the severity of depressive symptoms in different health conditions, including hypertension and diabetes, and could play the role of a chronic stressful condition that in turn increases the risk of developing depression^(10,11). In addition, depression has been linked to high cortisol levels that physical exercise could modulate, which means that older adults with some disability would be prevented from receiving an adequate therapy⁽²⁰⁾. Such conditions could explain the results of the present study and delve into the nature of the disability. Martina et al.⁽⁹⁾ found that 12.7 % of the Peruvian population over 60 years of age with a disability had some degree of depression, as well as a correlation between both variables. Similarly, Barboza et al.⁽¹⁰⁾ recorded a correlation when the depressive disorder was moderate or severe. This difference allows highlighting the importance of the degree of depressive disorder in the association with the disability. Given the reciprocal nature of disability and depression, it is possible that, in chronic conditions, extreme physical limitations may lead to depressive disorder or that, in severe depressive conditions, physical disability may be part of the symptoms of the disease^(11,20). The measurement instruments for depression and disability should also be considered, in addition to factors such as the sociocultural valuation given to physical capacity of the study population.

Among the limitations of the research it is worth mentioning that, since it was a secondary analysis, other variables of interest could not be included. Moreover, it was not possible to develop causal relationships due to the cross-sectional design of the study. However, the representative quality of the data obtained from the ENDES makes it possible to establish the correlation between the incidence of depression and physical disability, general comorbidities and sociodemographic factors at the national level, using a methodology validated by the INEI.

It is concluded that there is a low percentage of depressive

disorder among Peruvian older adults, as shown by a decrease registered since 2014. Likewise, belonging to the group over 85 years of age, being a female, suffering from a disability, belonging to lower wealth quintiles and having a lower educational level predispose older adults to have depressive disorder.

It is recommended to conduct studies to evaluate the incidence of depressive disorder among older adults, within their own demographics and social environment, in order to identify their specific limitations, as well as addressing mental health treatment through health strategies that are not implemented in isolation but in relation to policies aimed at modifying the sociodemographic factors of the population.

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BIBLIOGRAPHIC REFERENCES

1. World Health Organization. Ageing and health. WHO; 2022. Available from: <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>
2. Huenchuan S. Envejecimiento, personas mayores y Agenda 2030 para el Desarrollo Sostenible: perspectiva regional y de derechos humanos [Internet]. CEPAL; 2018. Available from: https://repositorio.cepal.org/bitstream/handle/11362/44369/1/S1800629_es.pdf
3. Aranco N, Stampini M, Ibarrarán P, Medellín N. Panorama de envejecimiento y dependencia en América Latina y el Caribe [Internet]. Banco Interamericano de Desarrollo; 2018. Available from: <https://publications.iadb.org/publications/spanish/document/Panorama-de-envejecimiento-y-dependencia-en-America-Latina-y-el-Caribe.pdf>
4. Instituto Nacional de Estadística e Informática. Estado de la Población Peruana 2020 [Internet]. INEI; 2020. Available from: https://www.inei.gob.pe/media/MenuRecursivo/publicaciones_digitales/Est/Lib1743/Libro.pdf
5. Cho SM, Saw YM, Saw TN, Than TM, Khaing M, Khine AT, et al. Prevalence and risk factors of anxiety and depression among the community-dwelling elderly in Nay Pyi Taw Union Territory, Myanmar. *Sci Rep* [Internet]. 2021;11(1):9763.
6. Castillo-Martell H, Cutipé-Cárdenas Y. Implementación, resultados iniciales y sostenibilidad de la reforma de servicios de salud mental en el Perú, 2013-2018. *Rev Peru Med Exp Salud Publica* [Internet]. 2019;36(2):326-33.
7. Del Carmen Sara JC. Lineamientos y estrategias para mejorar la calidad de la atención en los servicios de salud. *Rev Peru Med Exp Salud Publica* [Internet]. 2019;36(2):288-95.
8. Calderón D. Epidemiología de la depresión en el adulto mayor. *Rev Medica Hered* [Internet]. 2018;29(3):182-91.

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9. Martina M, Ara MA, Gutiérrez C, Nolberto V, Piscocoya J. Depresión y factores asociados en la población peruana adulta mayor según la ENDES 2014-2015. *An Fac med [Internet]*. 2017;78(4):393-7.
10. Barboza JJ, Soriano-Moreno AN, Copez-Lonzoy A, Pacheco-Mendoza J, Toro-Huamanchumo CJ. Disability and severe depression among Peruvian older adults: Analysis of the Peru Demographic and Family Health Survey, ENDES 2017. *BMC Psychiatry [Internet]*. 2020;20(1):253.
11. Noh J-W, Kwon YD, Park J, Oh I-H, Kim J. Relationship between physical disability and depression by gender: A panel regression model. *PLoS One [Internet]*. 2016;11(11):e0166238.
12. Wu Q, Feng J, Pan C-W. Risk factors for depression in the elderly: An umbrella review of published meta-analyses and systematic reviews. *J Affect Disord [Internet]*. 2022;307:37-45.
13. Kiely KM, Brady B, Byles J. Gender, mental health and ageing. *Maturitas [Internet]*. 2019;129:76-84.
14. Escobar Bravo MA, Botigüé Satorra T, Jürschik Giménez P, Nuin Orrio C, Blanco Blanco J. Sintomatología depresiva en ancianos. La influencia del género. *Rev Esp Geriatr Gerontol [Internet]*. 2013;48(2):59-64.
15. Richardson RA, Keyes KM, Medina JT, Calvo E. Sociodemographic inequalities in depression among older adults: cross-sectional evidence from 18 countries. *Lancet Psychiatry [Internet]*. 2020;7(8):673-81.
16. Freeman A, Tyrovolas S, Koyanagi A, Chatterji S, Leonardi M, Ayuso-Mateos JL, et al. The role of socio-economic status in depression: results from the COURAGE (aging survey in Europe). *BMC Public Health [Internet]*. 2016;16(1):1098.
17. Smith ML, Kakuhikire B, Baguma C, Rasmussen JD, Perkins JM, Cooper-Vince C, et al. Relative wealth, subjective social status, and their associations with depression: Cross-sectional, population-based study in rural Uganda. *SSM Popul Heal [Internet]*. 2019;8(100448):100448.
18. Ettman CK, Adam GP, Clark MA, Wilson IB, Vivier PM, Galea S. Wealth and depression: A scoping review. *Brain Behav [Internet]*. 2022;12(3):e2486.
19. Liu J, Yan F, Ma X, Guo H-L, Tang Y-L, Rakofsky JJ, et al. Prevalence of major depressive disorder and socio-demographic correlates: Results of a representative household epidemiological survey in Beijing, China. *J Affect Disord [Internet]*. 2015;179:74-81.
20. Booij SH, Wigman JTW, Jacobs N, Thiery E, Derom C, Wichers M, et al. Cortisol dynamics in depression: Application of a continuous-time process model. *Psychoneuroendocrinology [Internet]*. 2020;115(104598):104598.
21. De La Guardia Gutiérrez MA, Ruvalcaba Ledesma JC. La salud y sus determinantes, promoción de la salud y educación sanitaria. *JONNPR [Internet]*. 2020;5(1):81-90.
22. Consejo Nacional para la Integración de la Persona con Discapacidad - CONADIS. Compendio Estadístico Multisectorial 2019 'Aproximaciones sobre la discapacidad en el Perú' [Internet]. Ministerio de la Mujer y Poblaciones Vulnerables; 2019. Available from: <https://conadisperu.gob.pe/observatorio/wp-content/uploads/2020/11/Compendio-Estadistico-Multisectorial-2019.pdf>
23. Organización Panamericana de la Salud. Perú - La carga de los trastornos mentales en la Región de las Américas: Perfil del país [Internet]. OPS; 2018. Available from: https://www.paho.org/sites/default/files/2020-09/MentalHealth-profile-2020-Peru_esp.pdf
24. Organización Panamericana de la Salud. La carga de los trastornos mentales en la Región de las Américas, 2018 [Internet]. OPS; 2018. Available from: https://iris.paho.org/bitstream/handle/10665.2/49578/9789275320280_spa.pdf?sequence=9&isAllowed=y
25. Villarreal-Zegarra D, Copez-Lonzoy A, Bernabé-Ortiz A, Melendez-Torres GJ, Bazo-Alvarez JC. Valid group comparisons can be made with the Patient Health Questionnaire (PHQ-9): A measurement invariance study across groups by demographic characteristics. *PLoS One [Internet]*. 2019;14(9):e0221717.
26. Calderón M, Gálvez-Buccollini JA, Cueva G, Ordoñez C, Bromley C, Fiestas F. Validación de la versión peruana del PHQ-9 para el diagnóstico de depresión. *Rev Peru Med Exp Salud Publica [Internet]*. 2012;29(4):578-85.
27. Diez-Canseco F, Ipince A, Toyama M, Benate-Galvez Y, Galán-Rodas E, Medina-Verástegui JC, et al. Atendiendo la salud mental de las personas con enfermedades crónicas no transmisibles en el Perú: retos y oportunidades para la integración de cuidados en el primer nivel de atención. *Rev Peru Med Exp Salud Publica [Internet]*. 2014;31(1):131-6.
28. Organización Mundial de la Salud. Convenio Marco de la OMS para el Control del Tabaco [Internet]. OMS; 2003. Available from: <https://apps.who.int/iris/bitstream/handle/10665/42813/9243591010.pdf;jsessionid=79C40D4DD95B5ABA23DBEB766A8B3EEB?sequence=1>
29. Organización Mundial de la Salud. Plan de Acción Mundial sobre el Alcohol 2022-2030 con el fin de fortalecer la aplicación de la Estrategia Mundial para Reducir el Uso Nocivo del Alcohol [Internet]. OMS; 2021. Available from: https://cdn.who.int/media/docs/default-source/alcohol/alcohol-action-plan/first-draft/global-alcohol-action-plan_first_draft_es.pdf?sfvrsn=59817c21_5
30. do Nascimento PG, Molerio Pérez O, Pedraza Durán L. La prevención del tabaquismo y el alcoholismo en adolescentes y jóvenes desde las instituciones educativas. *Psicogente [Internet]*. 2014;17(31):93-106

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