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| RESEARCH ARTICLE

Obesity in Ecuador: An In-depth Look at its Influence on Mental Well-being

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| ABSTRACT

Analyzing the empirical relationship between obesity and mental health in the Ecuadorian population contributes significantly to the literature since obesity is an important risk factor for somatic diseases such as metabolic syndrome, cardiovascular disease, liver damage, respiratory diseases and arthropathies. However, obesity also constitutes one of the main "social stigmas", with a marked impact on the individual psychological level. The high prevalence of psychological pathology in obese patients makes it possible to visualize it as a psychiatric problem, which should be identified and treated simultaneously with weight control programs. A nationally representative sample of men and women over 18 years of age from the National Health and Nutrition Survey 2018 (ENSANUT) was used. A binary logistic linear regression model was used where Odds Ratio (OR) with their 95% confidence intervals (95% CI) were estimated for each of the independent variables. Our results show that those with a Body Mass Index ≥ 30 have a higher propensity to suffer from chronic mental disorders. That is, our results reveal that obesity increased 2.32 times (OR= 2.32; CI=1.91-2.17) the probability of suffering from chronic mental illnesses. This result is statistically significant ($p<0.05$). It was also shown that women in rural areas, with lower income and low schooling are more susceptible to mental disorders compared to the rest of the population. Another interesting result is that individuals working in the informal sector presented a greater probability of presenting psychological pathologies, this result is differentiated between men (OR= 1.032; CI=1.321-1.765) and women (OR= 1.056; CI=1.032-1.076), the effect being greater in informal women. Obesity and mental health disorders are two relevant problems in the world public health debate mainly due to their high physical and economic costs, which affect a high percentage of the population. Positive and statistically significant effects of obesity with psychological pathology were found in the general Ecuadorian population. This work was able to demonstrate the approximation of the relationship between obesity and mental health in a country in which the prevalence of both problems has increased considerably over the years.

| KEYWORDS

Obesity, Mental health, Mental disorders

| ARTICLE INFORMATION

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1. Introduction

Overweight and obesity constitute one of the greatest global public health challenges. According to the World Health Organization, it is estimated that by 2030, half of the world's population will be overweight and obese (WHO, 2024).(*WHO, 2024.*). In Latin America, in 2016, it was recorded that approximately 29% of the adult population, including men and women, had a BMI greater than 30 (Ríos-Reyna et al., 2022).. In the Ecuadorian case, 19.3% of the Ecuadorian adults registered obesity (Instituto

Nacional de Estadpisticas y Censos [INEC], 2018).. This situation is alarming because currently this epidemic negatively affects several aspects of health and increases the risk of many chronic diseases in those who suffer from it, such as pulmonary diseases, metabolic syndrome, heart disease, diabetes, cancer, liver disease, gynecological disorders, as well as venous and periodontal disease (Russell & Allen, 2008). Other associated conditions include arterial hypertension (AHT), skin problems, osteoarthritis, and psychological problems(DDe las Cuevas et al., 2011).

Nowadays, obesity is not strictly considered a mental disorder. However, for some decades now, the relationship between obesity and possible concomitant psychological alterations has been studied, without reaching a consensus on the existence of a specific psychological profile (Alonso & Olivos, 2020).. The psychological pathology associated with obesity, although it has not been clearly established whether it is a cause or effect of it, i.e., some authors consider psychological factors as a cause of obesity, others believe that it is a consequence of social discrimination towards the obese(González-Becerra et al., 2023).. Consequently, the interaction between emotional symptoms and their impact on the destructuring of eating patterns and sedentary lifestyles is evident (Rodríguez-Hernández et al. (Rodríguez-Hernández et al., 2011).. Several studies have pointed out the presence of physical and sexual abuse in patients with obesity, as well as a prevalence of psychiatric disorders between 30-60%, recognizing affective disorders, anxiety disorders and eating behavior disorders (ED) as the most frequent ones (Forero et al., 2023).. In turn, these psychosocial consequences of obesity determine behavioral patterns and personality models, which have an influence on caloric intake and energy expenditure and, consequently, on weight gain (Tamayo Lopera & Restrepo, 2014)..

Psychological stress may upregulate physiological stress pathways through mechanisms such as alterations in insulin signaling, positive regulation of corticosteroid production or proinflammatory activation. Therefore, it is concluded that low mood in healthy children is associated with poorer metabolic health independent of adiposity. This situation is alarming because of the great social and economic cost it entails, since currently having a high weight constitutes one of the main "social stigmas", diminishing labor and educational opportunities, with the consequent individual psychological cost (Villalobos et al., 2019).. The obese patient is subjected to multiple psychological problems, such as social discrimination, leading to severe behavioral consequences; personal, occupational and sexual limitations leading to decreased self-esteem and isolation. Bobadilla and López (2014) in their study conducted on men and women with obesity, showed that satisfaction with body image is directly related to depression and low self-esteem. The background they used for this research is that obese individuals who were seeking to reduce weight demonstrated a high prevalence of distress compared to obese individuals without this interest in weight reduction (Friedman et al., 2002).

On the other hand, another study showed that 60% of obese people exposed to psychological stress suffer hyperphagia as a pathological form of defense, accompanied by immature personalities, with anxious and depressive traits. This behavioral alteration was called "emotional eating behavior" or hyperphagia to stress, when food intake is not related to the sensation of hunger but to psychological discomfort (boredom, distress or difficulty in solving problems(Baldares, 2013). Obesity in this case, can be considered as the symptom or the consequence of a problem of psychological and social adjustment (Lazarevich et al., 2016).. A study conducted by Brito et al. (2000) in adolescents and young adults aged 15 to 21 years noted a higher rate of psychiatric conditions in obese patients than in the control group. Among these conditions, the following stand out: mood disorders, anxiety, eating behavior disorders with loss of control, somatic disorders, especially in morbidly obese patients (Wardle, 2005).. Galarsi et al. (2010) analyzed a sample of obese women with binge eating disorder, body dissatisfaction and its relationship with food restriction and depression; their findings showed that these four elements are closely related, and by treating depression with medication and improving body dissatisfaction with psychological therapies, the course of binge eating disorder improves and, therefore, the therapeutic success rate increases.

Therefore, the development of psychotherapy for the treatment of obesity may improve the prospects of the obese patient by addressing etiopathogenic factors, as well as by preventing relapses, treatment abandonment, and increasing tolerance to the hypocaloric diet (Larrañaga & García-Mayor, 2007).. Thus, the present research aims to clarify the psychological variables that are manifested around the growing phenomenon of obesity, its comorbidity and the impact it has on mental health, since this has a direct impact on the quality of life of obese adults. Therefore, there is a need to address this problem psychologically with an approach that considers both the etiology and the maintenance of obesity, cognitive variables (beliefs), affective variables (management of unpleasant emotional states) and environmental variables (customs, family habits, etc.).

2. Methodology

2.1 Survey and Population

The ENSANUT 2018 is a survey included in the National Statistical Program that uses probability sampling applied every 5 years and whose target population is all household members in the 24 provinces of Ecuador. The ENSANUT 2018 includes the HOGAR form where all the characteristics of the Ecuadorian population are evidenced in order to make representative estimates at the national level, urban-rural, by geographic domain for the 24 provinces of the country.

2.2 Source of Information

A cross-sectional study was conducted with data obtained from the 2018 National Health and Nutrition Survey of Ecuador (ENSANUT), whose data were obtained and presented by the National Institute of Statistics and Census (INEC). After cleaning the database, a total of 15546 Ecuadorians among men and women with obesity were obtained.

2.3 Study Variables

Our dependent variable was Obesity defined by BMI≥30. The information for this variable was obtained through the calculation made from the anthropometric data of weight and height provided in the form. In our independent variable that refers to information on the mental state of the person with obesity, we were able to obtain this information from the question: In the last 30 days have you had psychological discomfort? In addition, we were able to control for other variables such as sex, age, schooling, number of children, type of employment and hours of work.

2.4 Inclusion and Exclusion Criteria

Regarding the Inclusion and Exclusion Criteria, this study included data from those men and women over 18 years of age with BMI ≥ 30

2.5 Ethical considerations

The present study did not require the approval of an institutional ethics committee for its execution, since it is an analysis of data freely available to the public and it was not necessary to use informed consent.

2.6 Statistical Analysis

The ENSANUT 2018 survey database was analyzed with the statistical package Stata v15 (Stata Corporation, College Station, Texas, USA). A value of $p<0.05$ was considered to determine statistical significance between variables. The Chi-square test was used to determine the overall correlation between the variables of interest. The association was evaluated by prevalence ratios with their respective 95% confidence intervals with an analysis for each of the variables included in the study, the independent variable of interest being Acute Respiratory Infection. For the determination of the model of protective factors of breastfeeding against the incidence of Acute Respiratory Infections in infants under 6 months of age, binary logistic regression was applied to calculate the OR with its 95% confidence intervals; in addition, the sociodemographic characteristics were reported by absolute frequencies, the numerical variables were reported with the arithmetic mean.

Therefore, in order to estimate a discrete choice model that estimates the probability of suffering poor mental health:

$$Mental\ Wellbeing_i = \beta_0 + \beta_1 X_i + \sum_{j=2}^{12} \beta_j Z_i + \varepsilon_i \quad (1).$$

Where $Mental\ Wellbeing_{i_i}$ represents the mental health of individuals (measured by asking whether or not a person suffers from a psychological problem), X_i represents the dichotomous variable of obesity, and Z_i represents a set of control variables of the linear regression model. Finally, ε_i represents the stochastic error term.

Finally, for the determination of the predictor variables, the ROC curve was applied with the probabilities estimated by applying logistic regression under the method of introducing their confidence intervals and their statistical significance $p < 0.05$.

3. Results

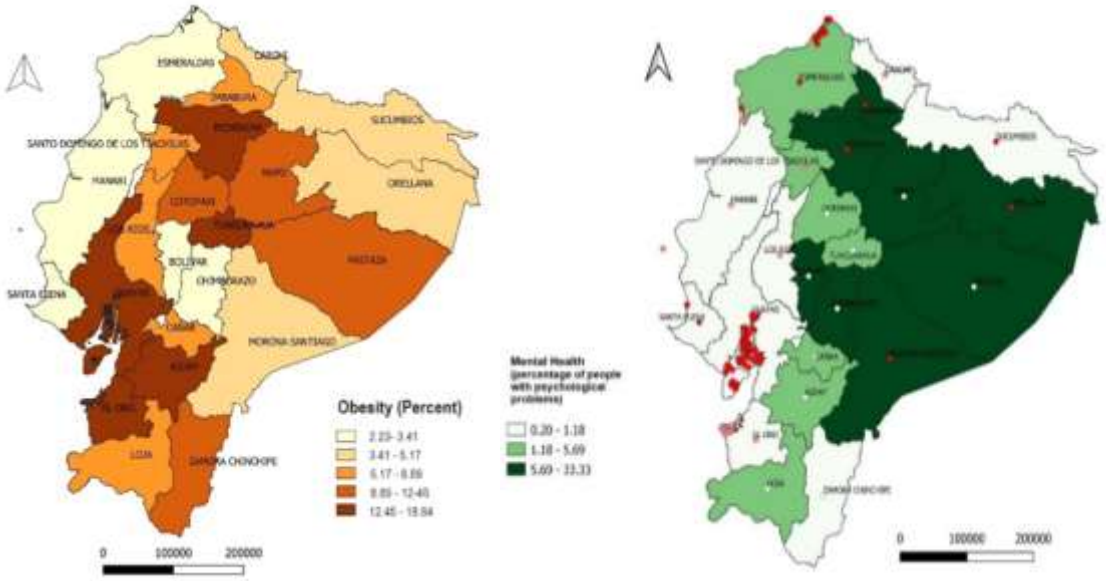
Table 1 shows the descriptive statistics of the variables. Here we analyze all the variables used in this study and see that the sample is 8325 men and 7221 women, giving a total sample of 15546 individuals. We observe that 15.69% (CI=15.02%-16.77%) of the sample reported suffering from psychological problems. This percentage is alarming, given that almost a quarter of the population has poor mental health. This fact makes it evident that mental health policies should be a priority in a developing country like Ecuador. In addition, we note that, in line with the above evidence, 18.55% of the sample suffers from obesity. That is, they have a body mass index (BMI) greater than or equal to 30. This figure is also alarming. Therefore, there seems to be an obvious positive relationship between obesity and mental health. The average age of the sample is 34 years and 53.33% are men. Also, the average number of children is 4. On the other hand, the average monthly labor income is $444.01 USD. The average years of schooling is 7 years of schooling. This shows that the level of schooling is relatively low in Ecuador. Unemployment is reported by 30.55% of the respondents and the average number of working hours is 42.78. In addition, 82.52% of the sample reported that they had migrated at some point. This fact evidences that Ecuador is a country of high internal migration. In terms of ethnicity, 75.61% of the population is mestizo, the average urban density is 157 people per square kilometer, while we observe that 55.51% of people are from the urban area.

Table 1: Descriptive statistics of the variables used in this study

Variable	Mean-Percent	SD	Min	Max	95% CI	
Did you have psychological problems?						
Yes	25..89%	0.44	0	1	25.02%	- 26.77%
No	74.11%	0.89	0	1	73.17%	- 75.43%
Obesity						
No	81.45%	0.12	0	1	78,45%	- 93,45%
Yes	18.55%	0.43	0	1	15,55%	- 21,55%
Age						
Age	33.8	0.12	19	55	33.13	- 34.22
Sex						
Woman	46.67%	0.14	0	1	43,67%	- 48,67%
Man	53.33%	0.33	0	1	50,33%	- 55,33%
Number of children						
Number of children at home	4.12	0.25	0	8	4.01	- 4.98
Monthly labor income						
Income in dollars	444.01	100	0	2033	441.68	- 448.49
Years of schooling						
Years of schooling	7.08	1.77	0	22	2.97	- 3.96
Work method						
Employee	69.45%	0.66	0	1	66,45%	- 71,45%
Unemployed	30.55%	0.26	0	1	27,55%	- 32,55%
Out of the workforce	3.55%	0.26	0	1	2,67%	- 3,77%
Working hours						
Number of working hours	42.78	0.55	4	52	41.54	- 46.86
Are you a migrant?						
No	17.48	0.89	0	1	14,48%	- 19,48%
Yes	82.52%	0.67	0	1	79,52%	- 84,52%
Ethnicity						
Indigenous	14.73%	0.35	0	1	14.26%	- 15.20%
Afro-Ecuadorian	4.03%	0.20	0	1	3.77%	- 4.29%
Mongrel	75.61%	0.43	0	1	75.04%	- 76.18%
White	1.32%	0.11	0	1	1.17%	- 1.47%
Montubio	4.31%	0.20	0	1	4.04%	- 4.58%
Urban density						
Inhabitants per square kilometer	157.01	1152.5	321	2653.12	146.32	- 160.33
Area						
Urbana	55.51%	0.54	0	1	52,51%	- 57,51%
Rural	44.49%	0.36	0	1	41,49%	- 46,49%

Subsequently, to complement the idea that there is a relationship between obesity and mental health, **Figure 1** shows the spatial distribution of obesity and mental health in Ecuador in all provinces. In the figures we observe that there is a significant pattern. In general, the provinces with the highest obesity are those that report the most psychological problems in Ecuador. This is evidence that there is indeed a direct relationship between mental health and obesity as shown in our results.

Figure 1: Provincial spatial distribution of obesity and mental health in Ecuador**.**



Next, in order to see if there are statistically significant differences between the group of men and women, in Table 2 we performed a test of mean differences for groups with different variances. In this table we observe that all the variables (dependent and independent) used in our study have a significant statistical difference, since the p-value rejects the null hypothesis of an equality of means between the groups. Specifically, we observed that the p-value is less than 0.05. Therefore, we can say that the observed characteristics of the individuals in our sample are statistically different. This warrants performing our linear regression analyses below for the group of men and women since obesity impacts men and women in different ways (and magnitudes).

Table 2. Mean difference test for groups with different variances

Variable	Men	Women	P-value
Did you have psychological problems?	7.72	6.80	0.000
Obesity	9.21	10.88	0.000
Age	33.57	31.44	0.000
Sex	51.70	42.73	0.000
Number of children	2.85	1.80	0.000
Monthly labor income	444.68	349.75	0.000
Years of schooling	7.06	5.11	0.000
Work method	9.76	6.69	0.000
Working hours	35.75	42.94	0.000
Are you a migrant?	11.26	6.73	0.000
Ethnicity	34.92	30.12	0.000
Urban density	46.35	39.28	0.000
Urban area	34.77	33.76	0.137

Next, we performed a formal test to rule out the presence of multicollinearity among our independent variables. In **Table 3** we present a multicollinearity analysis. We use the Variance Inflator Factor (VIF) to perform this test. Previous literature indicates that a VIF greater than 5 can demonstrate that multicollinearity exists in our data. As we can see, no variable has a VIF greater than 5, thus we rule out multicollinearity problems in our independent variables. This analysis is important since multicollinearity problems cause instability of the parameters of a regression, incorrect signs and higher standard errors, which translates into statistical insignificance of the parameters.

Table 3: Multicollinearity test of the variables

Variable	VIF	SQRT VIF	Tolerance	R-Squared
Obesity	1.55	1.33	0.9966	0.0004
Age	2.14	1.98	0.9918	0.0082
Sex	2.89	1.09	0.6101	0.3899
Number of children	1.88	1.76	0.6145	0.3855
Monthly labor income	1.97	1.65	0.9764	0.0236
Years of schooling	1.45	1.88	0.8821	0.1179
Work method	1.66	1.43	0.8812	0.1188
Working hours	1.44	1.75	0.6310	0.3690
Are you a migrant?	1.12	1.86	0.9146	0.0854
Ethnicity	1.88	1.67	0.7746	0.2254
Urban density	1.67	1.09	0.8583	0.1417
Urban area	1.05	1.32	0.9537	0.0463
Mean VIF	1.90			

Subsequently, in **Table 4** we observe the grouped age and the number of people with psychological problems and obesity. Here we observe that as age increases, so do the cases of psychological problems and obesity. In this table we can observe an interesting pattern: individuals suffering from obesity are almost equal to those suffering from psychological problems within all age ranges. This fact leads us to strongly suspect that there is a strong positive relationship between obesity and psychological problems.

Table 4: Age grouped and number of cases of psychological problems and obesity

	Psychological problems		Obesity	
Age	**Yes**	**No**	**Yes**	**No**
19-25	39	256	59	302
26-30	67	238	89	295
31-35	134	299	98	399
36-40	143	304	199	418
41-45	149	499	119	418
46-50	263	456	169	597
51-55	335	521	278	532

A multivariate logistic regression analysis to analyze factors influencing mental health in the sample of men is shown below in **Table 5.** Our logistic regression involves 8325 men. Here we note that the dependent variable is a dichotomous variable that takes the value of 1 if a man reported having had psychological problems. We find that, as expected, the odd ratio (OR) of having suffered from obesity is significant and greater than 1. Our results show that those men who suffer from obesity have a higher risk of suffering from psychological problems. That is, our results specifically show that suffering from obesity increases the probability of suffering from psychological problems by 2.32 times (OR= 2.32; CI=1.91-2.17). This result is statistically significant. It was also demonstrated that other variables that influence mental health are the number of children, which positively affects the probability of suffering psychological problems. Likewise, labor income reduces the probability of suffering from psychological problems by 2.03 times. A similar result is observed in the variable of years of schooling. Being unemployed and out of the labor force also positively predicts the probability of suffering from psychological problems. An interesting variable is migration, as we find that migrants are more likely to suffer from mental illness. Finally, we also observe that living in a more densely populated city increases the risk of suffering from psychological problems. In **Table 5** we also observe that the chi-square (X^2) and log-likelihood statistics are stable and statistically correct. The chi-square statistic is significant suggesting that, taken together, the independent variables jointly explain the variability of the dependent variable. On the other hand, the log-likelihood statistic is negative and is observed to collect as much information as possible.

Table 5: Logistic regression analysis between mental health and obesity in males

Variable	OR	Std. Err.	P>z	95% CI
Obesity				
No	Ref.			
Yes	2.32**	0.982	0.002	1.986 - 2.621
Age				
Age	1.001	0.863	0.057	0.872 - 1.321
Number of children				
Number of children at home	1.032**	0.054	0.004	1.012 - 1.453
Monthly labor income				
Income in dollars	-2.981**	0.687	0.872	-2.001 - -1.321
Years of schooling				
Years of schooling	-1.686***	0.542	0.001	-1.543 - -1.754
Work method				
Employee	Ref.			
Unemployed	1.455*	0.216	0.032	1.321 - 1.765
Out of the workforce	1.032*	0.321	0.021	1.321 - 1.765
Working hours				
Number of working hours	1.653	0.654	0.035	1.345 - 1.897
Are you a migrant?				
No	Ref.			
Yes	1.567*	0.535	0.045	1.354 - 1.853
Ethnicity				
Indigenous	Ref.			
Afro-Ecuadorian	-1.043	0.312	0.067	-1.012 - -1.231
Mongrel	-1.065	0.432	0.655	1.001 - 1.198
White	-1.986	0.563	0.192	-1.452 - -2.004
Montubio	1.654	0.643	0.431	1.594 - 1.865
Urban density				
Inhabitants per square kilometer	1.654**	0.543	0.031	1.493 - 1.985
Area				
Urbana	Ref.			
Rural	1.456	0.753	0.912	1.321 - 1.764
Observations	8325			
AIC	23975.03			
BIC	23138.09			
R^2	0.025			
X^2	3.956***			
Log-likehood	-31461.5			

Notes: Asterisks mean: *p < 0.10,**p < 0.05, ***p < 0.01. In the table, the dependent variable is the dichotomous variable of psychological problems that takes a value of 1=Yes and 0=No.

Subsequently, **Table 6** shows a multivariate logistic regression analysis to analyze the factors influencing mental health in the sample of women. Our logistic regression involves 7221 men. Here we note that the dependent variable is a dichotomous variable that takes the value of 1 if a woman reported having had psychological problems. We find that, as expected, the odd ratio (OR) of having suffered from obesity is significant and greater than 1. Our results show that those women who suffer from obesity have a

higher risk of suffering from psychological problems. That is, our results specifically show that suffering from obesity increases the probability of suffering from psychological problems by 3.12 times (OR=3.12; CI=3.046-3.321). This result is statistically significant. This fact shows that the psychological impact of obesity is greater in women than in men. As in the regression for the group of men, it was shown that other variables that influence mental health are the number of children, positively affecting the probability of suffering psychological problems, although we observed a greater impact on women. Likewise, labor income reduces the probability of suffering from psychological problems by 2.48 times. A similar result is observed for the years of schooling variable. Being unemployed and out of the labor force also positively predicts the probability of suffering psychological problems. An interesting variable is migration, as we find that migrants are more likely to suffer from mental illness. Finally, we also observe that living in a more densely populated city increases the risk of suffering from psychological problems. As in the previously described table, in **Table 6** we observe that the chi-square (X^2) and log-likelihood statistics are stable and statistically correct. The chi-square statistic is significant suggesting that, as a whole, the independent variables together explain the variability of the dependent variable. On the other hand, the log-likelihood statistic is negative and is observed to collect as much information as possible.

Table 6: Logistic regression analysis between mental health and obesity in women

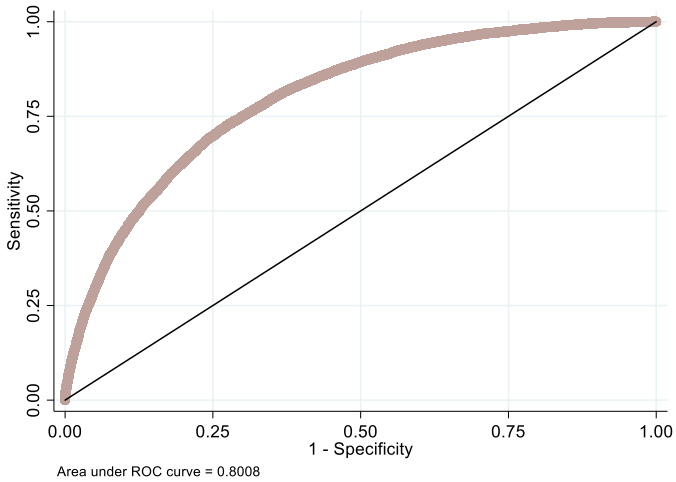
Variable	OR	Std. Err.	P>z	95% CI
Obesity				
No	Ref.			
Yes	3.12**	0.982	0.002	3.046 - 3.321
Age				
Age	1.001	0.863	0.057	0.872 - 1.321
Number of children				
Number of children at home	2.112**	0.054	0.004	2.096 - 2.197
Monthly labor income				
Income in dollars	-2.489**	0.987	0.872	-2.001 - -2.321
Years of schooling				
Years of schooling	-1.686***	0.542	0.001	-1.543 - -1.754
Work method				
Employee	Ref.			
Unemployed	1.55*	0.216	0.032	1.321 - 1.765
Out of the workforce	1.056*	0.321	0.021	1.0321 - 1.0765
Working hours				
Number of working hours	1.653	0.654	0.035	1.345 - 1.897
Are you a migrant?				
No	Ref.			
Yes	1.567*	0.535	0.045	1.354 - 1.853
Ethnicity				
Indigenous	Ref.			
Afro-Ecuadorian	-1.043	0.312	0.067	-1.012 - -1.231
Mongrel	-1.065	0.432	0.655	1.001 - 1.198
White	-1.986	0.563	0.192	-1.452 - -2.004
Montubio	1.654	0.643	0.431	1.594 - 1.865
Urban density				
Inhabitants per square kilometer	1.654**	0.543	0.031	1.493 - 1.985
Area				
Urbana	Ref.			
Rural	1.456	0.753	0.912	1.321 - 1.764
Observations	7221			
AIC	24232.03			
BIC	23520.09			

R^2	0.025
X^2	3.956***
Log-likehood	-31221.5

Notes: Asterisks mean: *p < 0.10,**p < 0.05, ***p < 0.01. In the table, the dependent variable is the dichotomous variable of psychological problems that takes a value of 1=Yes and 0=No.

Finally, to determine the fit and explanation of the independent variables, the ROC curve was applied with the probabilities estimated by applying logistic regression. The ROC curve in **Figure 2** coincides with the probability of correctly distinguishing a case of psychological problems from another that is not, through the significant predictor variables, the worst scenario being when the area is equal to 0.50. In our case, suffering from obesity together with other significant variables, such as labor income, schooling, number of children, having been a migrant, age, being unemployed or out of the labor force, and urban density, represented an area under the curve of 0.80880 (95% CI: 0.752-0.854), considering that they adequately predict (positively or negatively) cases of psychological problems (p < 0.001).

Figure 2. ROC curve of the estimated model.



On the other hand, to give rigor to our analysis, **Figure 3** shows the confusion matrix of the model, indicating that the independent variables explain in great proportion the variability of our independent variable, specifically we observe that the independent variables explain 73.47% of the variability in the dependent variable, being this percentage relatively high.

Figure 3: Confusion matrix of the estimated model of the model.

Classified	True D	True ~D	Total
+	5516	2444	7960
-	3596	11210	14806
Total	9112	13654	22766

Classified + if predicted Pr(D) >= .5
True D defined as sectores != 0

Sensitivity	Pr(+| D)	60.54%
Specificity	Pr(-|~D)	82.10%
Positive predictive value	Pr(D| +)	69.30%
Negative predictive value	Pr(~D| -)	75.71%
False + rate for true ~D	Pr(+|~D)	17.90%
False - rate for true D	Pr(-| D)	39.46%
False + rate for classified +	Pr(~D| +)	30.70%
False - rate for classified -	Pr(D| -)	24.29%
Correctly classified		73.47%

4. Discussion

Obesity is a disease that has increased considerably in recent decades and has multifactorial causes, including genetic, metabolic, psychological, social, and cultural factors(Diabetes (SAD) et al., 2022).. This raises the need to approach obesity from a psychological approach (Larrañaga & García-Mayor, 2007).. It is important to keep in mind that obesity is one of the main "social stigmas", with a significant impact on individual mental health, although it is not considered a psychiatric disorder (Gómez-Pérez et al., 2017).. Both obesity and mental health have gained prominence in the public health debate due to the large number of people affected by these conditions(Domingo & López, 2014). This is significant considering that both problems are associated with lower labor productivity and lower wages, in addition to being costly for governments (León R. et al., 2017).

The present study describes how obesity and sedentary lifestyle are strongly associated with poorer mental health in the population studied. The research revealed that 25.89% (CI=25.02%-26.77%) of the sample reported psychological problems, an alarming percentage indicating that almost a quarter of the population has poor mental health. This highlights the need to prioritize mental health policies in developing countries such as Ecuador.

In addition, it was observed that men with obesity have a greater risk of suffering psychological problems, since the results indicate that suffering from obesity increases the probability of having psychological problems by 2.32 times (OR=2.32; CI=1.98-2.62), this result being statistically significant. It was also shown that other variables, such as the number of children, influence mental health, positively affecting the probability of suffering psychological problems (OR=1.032; CI=1.012-1.453). In women, obesity increases the probability of suffering psychological problems by 3.12 times (OR=3.12; CI=3.046-3.321). It is also evident that in the population other significant variables, such as labor income, schooling, number of children, having been a migrant, age, being unemployed or out of the labor force and urban density, represented an area under the curve of 0.80880 (95% CI: 0.752-0.854), adequately predict (positively or negatively) cases of psychological problems (p < 0.001).

These findings are consistent with studies by the World Psychiatric Association, which in 2007 found that, after adjusting for age, sex, and educational level, obesity was significantly associated with depressive and anxiety disorders in women, especially with higher BMIs (Scott et al., 2008).. The results of the present cross-sectional study are in line with other studies conducted in different contexts, which have evaluated the relationship between physical exercise and mental health, demonstrating a causal association(Martín Aranda, 2018). The results can be attributed in part to the adaptations derived from an active lifestyle, which reduce the incidence of mental health problems, depression or anxiety(Bravo Moya, 2020). On the other hand, a study conducted in Mexico, which evaluated the relationship between obesity and depression in a school educational center, showed that visceral obesity was associated with symptoms of depression and social isolation (OR=2.380, 95% CI 1.108-5.112, p=0.26).(González-Toche

et al., 2017).. That is why, this study is one of the first of its kind in the country, conducted with a broad population base to define the association between mental health and the impact that obesity entails. From a public health perspective, it is described that the consequences of obesity on mental health are observed from the early stages of life. In general, a healthy weight is associated with various dimensions of psychological well-being, while leisure time physical activity is a good indicator of child health status in a broad sense.

5. Conclusion

Obesity is a problem with a great negative impact on mental health. In our country, it is imperative to conduct studies on this issue, considering gender differences and socioeconomic strata, in order to manage the situation more effectively from a multidisciplinary approach. This means that each case of obesity must be approached individually, since the explanation and treatment of one case will never be exactly the same as that of another. Hence the need for interdisciplinary work that addresses every detail that influences this problem.

The approach and treatment of psychological characteristics is fundamental, since without this, the patient may have difficulties to adequately engage with the treatment and, in general, may find it more difficult to lose weight and/or maintain it. It is important to remember that the human being is a bio-psycho-social entity, and as such, all therapies should be approached from this perspective, including the treatment of obesity.

The implementation of nutritional treatments and lifestyle changes does not seem sufficient to control overweight/obesity, because obesity is a multifactorial condition where the emotional state is a crucial component and often the most difficult to manage. Criteria for therapeutic success should consider not only weight reduction as an end result, but a continuous process with positive results in quality of life and a less sedentary lifestyle. This includes active integration of exercise, greater acceptance of body image and a change in eating habits, along with disease awareness that avoids relapses, which should not be seen as a total treatment failure.

Therefore, it is essential to open new lines of research and intervention to address this issue and promote exclusive breastfeeding because of its health, social and economic benefits. Promoting breastfeeding should be a key objective of health policies to significantly reduce maternal and infant morbidity and mortality.

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