# Fatores associados à violência conjugal em um grupo de mulheres no município de João Pessoa – Paraíba.

## Factors associated with domestic violence against women in João Pessoa - Paraíba. [1]

# Factores vinculados a la violencia conyugal en un grupo de mujeres en el municipio de João Pessoa - Paraíba.

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**ABSTRACT:** The aim of the present study was to investigate the factors associated with domestic violence against women in the city of João Pessoa, state of Paraíba, Brazil. For this purpose, we conducted a quantitative analytical study using logistic regression for the statistical analysis of the data. The study was conducted in the Police Station Specialized in Assistance to Women in João Pessoa, using a sample of 291 women older than 18 years of age, of which 206 had experienced domestic violence and 85 had not experienced domestic violence within one year of enrollment. The subjects were selected between April and August 2012 via convenience sampling. The variables related to personal, social, and economic characteristics were identified using a questionnaire and were used to construct the final probabilistic model. The results indicated that previous episodes of domestic violence against women involved an approximately five-fold increase in the likelihood of new episodes of violence. In addition, being retired or a pensioner involved an approximately nine-fold decrease in the chance of violence against women. With respect to men, an income lower than 2.5 times the minimum wage and a history of family violence involved a two-fold increase in the chance of abuse against the partner. The chance of aggression involved an approximately two-

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fold decrease in cases in which men were married. These findings indicate that domestic violence is a complex phenomenon and that its occurrence is associated with personal, social, economic, and cultural factors.

Keywords: Violence against women, Causality, Gender Identity,

**RESUMO:** O estudo objetivou investigar fatores associados à violência conjugal em um grupo de mulheres no município de João Pessoa-PB. Para atender ao objetivo, realizou-se uma pesquisa do tipo analítico, com abordagem quantitativa, cuja ferramenta de análise estatística dos dados foi a Regressão Logística. O local do estudo correspondeu à Delegacia Especializada de Atendimento à Mulher do município de João Pessoa, onde foi selecionada, por conveniência, no período compreendido entre abril e agosto de 2012, uma amostra de 291 mulheres maiores de 18 anos, das quais 206 sofreram violência conjugal e 85 não sofreram violência conjugal a menos de um ano. As variáveis relacionadas às características pessoais, sociais e econômicas dos sujeitos do estudo foram identificadas no questionário aplicado às mulheres e utilizadas para a obtenção do modelo probabilístico final. Os resultados demonstraram que a situação da mulher ter sofrido violência anterior aumenta a chance de ser violentada novamente quase cinco vezes. Além disso, ser aposentada ou pensionista diminui a chance de a mulher sofrer agressão em quase nove vezes. No que tange aos homens, quando eles têm renda menor que dois salários mínimos e meio e têm história de violência na família, a chance de eles praticarem a violência contra a parceira aumenta em duas vezes. A chance de praticar a agressão diminui em quase duas vezes quando o homem é casado. Esses resultados indicam que a violência conjugal é um fenômeno complexo cuja ocorrência encontra-se associada a fatores de ordem pessoal, social, econômica e cultural.

Descritores: Violência contra a Mulher, Causalidade, Identidade de Gênero,

**RESUMEN:** El estudio tuvo como finalidad investigar factores vinculados a la violencia conyugal, en un grupo de mujeres en el municipio de João Pessoa/PB. Para alcanzar el objetivo, se realizó una investigación analítica, con abordaje cuantitativo, cuya herramienta de análisis estadístico de los datos fue la Regresión Logística. El estudio se llevó a cabo en la Comisaría Especializada de Atención a la Mujer de la ciudad de João Pessoa, donde se seleccionaron 291 mujeres mayores de 18 años, entre abril y agosto de 2012, de las cuales 206 sufrieron violencia conyugal y 85 no sufrieron violencia conyugal en el último año. Se identificaron las variables relacionadas con las características personales y socioeconómicas de los sujetos de estudio, que luego se utilizaron para obtener un modelo probabilístico final. Los resultados demostraron que el hecho de que la mujer haya sufrido violencia, en un período anterior, aumenta en cinco veces más la chance de sufrir nuevamente violencia. Además, ser jubilada o pensionista disminuye la chance de que la mujer sufra agresión en casi nueve veces. Respecto al hombre, cuando tiene una renta inferior a dos salarios mínimos y medio, y tiene un historial de violencia familiar, la chance de que él practique violencia contra su pareja aumenta el doble. La chance de practicar agresión disminuye en casi dos veces cuando el hombre es casado. A partir de los descubrimientos, se concluyó que la violencia conyugal es un fenómeno complejo, cuya ocurrencia se encuentra vinculada a factores

de orden personal, socioeconómico y cultural.

Descriptores: Violencia contra la mujer, Causalidad, Identidad de Género,

## INTRODUCTION

Historically, women have been victimized by various forms of discrimination and disrespect to human dignity by limiting their participation in political, social, cultural and economic life in different countries. One of the most atrocious forms of violation of the human rights of women is domestic violence, which represents one of most frequent types of aggression among women within the domestic environment, a space where affective relationships are developed and life projects are shared between its members[1].

In marital relations, women exposed to violence suffer different types of abuse on a daily basis, including sexual, physical, psychological, and moral abuse, which can cause acute physical injuries and chronic diseases and affect the mental health and social well-being of women[2-3]. Until the nineteenth century, the domestic environment remained silent on the acts of domestic violence committed against women by their partners. However, in recent decades, these manifestations have been revealed—primarily by feminist groups and international organizations—as a global problem. In Brazil, the phenomenon has also been considered a public health problem because it impacts the health of women and can disrupt their capacity to contribute to the development of society and their self-sufficiency[2].

Motivated by the far-reaching consequences—both individual and collective—of violence, this topic has frequently been addressed in international meetings, and the need to expand the knowledge about the factors associated with violence and to use this knowledge to plan and develop strategies to prevent and fight violence more effectively has been underscored.

In this context, the Pan American Health Organization has recommended that studies on violence assess the factors associated with the risk of the occurrence of violence, particularly factors that can be changed via intersectoral interventions[4]. These studies may contribute to the expansion of knowledge on violence and provide data to support local, national, and international studies aimed at assessing the status of women, having in view that they make up one of the population groups that is most vulnerable to this phenomenon[5].

Given the need for studies that address the factors predisposing to domestic violence, the aim of this study is to investigate the factors associated with domestic violence against women residing in João Pessoa, state of Paraíba, Brazil.

## METHODS

This study is analytical, observational, and quantitative in nature. The statistical analysis is performed using a logistic regression model. Logistic regression is a technique used to evaluate

the influence of factors (variables) in the appearance of a particular phenomenon or characteristic by establishing a statistical correlation between the event and the variables that characterize the population affected by the phenomenon under study[6].

In contrast to other regression models, the logistic model is adequate in cases in which the response variable (dependent) is qualitative, i.e., when data are expressed in a non-numerical form, e.g., gender and eye color[7,8]. This model enables the study of situations for which we must estimate the absence or occurrence of an event (response variable) from a set of factors (explanatory variables)[7,8]. Considering that the response variable has only two groups of interest (results) that may indicate either success (when the event of interest occurs) or failure (when the event of interest does not occur)[9], the values of the response variable will be 0 or 1, as shown in the following demonstration[10]:

Success is defined as "the most significant result of the response or the result that we intend to correlate with other variables of interest"[11]. Accordingly, the success group can be coded as 1, and the failure group can be coded as 0, or vice versa[10,12]. In situations in which $y_i$ has only two values (0 or 1), the dependent variable follows a Bernoulli distribution, which is a particular case of binomial distribution, as represented by the following equation[9]:

$$E(y) = \frac{\exp(x\beta)}{1+\exp(x\beta)} E(y) = \frac{\exp(x\beta)}{1+\exp(x\beta)} (y_i | x_i) \sim \text{Bin}(n_i, \pi_i) \qquad i = 1, 2 \ldots, n$$

where:

- $y_i = [y_1, y_2, \ldots, y_n]$ is a vector that contains the values of $n$ observations of the response variable[10];

- $n_i$ is the number of observations or values for each independent variable $x_{i1}, x_{i2}, x_{i3}, \ldots, x_{ip}$;

- $x_i = [1, x_{i1}, x_{i2}, \ldots, x_{ip}]^T$ is a vector of p independent variables[10]; and

- $\pi_i$ is the probability of the success of the response variable considering $x$[9,13].

According to the previous statement, the expected value of the response variable after considering the values of the explanatory variables is equal to the probability of the variable y to assume the value of 1, i.e., $E(y_i | x_i) = \pi_i$. When the response variable is binary, the error $\epsilon$ also assumes only two values:

The error value will be $\epsilon = 1 - \pi_i$ when $y_i = 1$

The error value will be $\epsilon = -\pi_i$ when $y_i = 0$

The variance is given by $\sigma^2_{yi} = \pi_i (1 - \pi_i)$[6,10,13]. Considering the binary nature (Bernoulli type)

of the dependent variable and considering the values of the independent variables, the logistic regression model predicts probability values that range from 0 to 1. To ensure that the values predicted for the response variable are included in that is range, an exponential function is used, resulting in the following general logistic regression model[13]:

$$log\left\{\frac{\pi_i}{1-\pi_i}\right\} = \beta_0 + \beta_1 x_1 + ... + \beta_p x_p \, log\left\{\frac{\pi_i}{1-\pi_i}\right\} = \beta_0 + \beta_1 x_1 + ... + \beta_p x_p$$

where:

- $\beta = [\beta_0, \beta_1, \beta_2, ..., \beta_p]^T$ refers to a vector of parameters to be estimated considering the dependent variable and the independent variables;

- $\beta_0 + \beta_1 x_1 + ... + \beta_p x_p \, \beta_0 + \beta_1 x_1 + ... + \beta_p x_p$ corresponds to the linear structure of the logistic regression model, designated the linear predictor $\eta$[10]; and

- $log\left(\frac{\pi_i}{1-\pi_i}\right) log\left(\frac{\pi_i}{1-\pi_i}\right)$, also known as the logit function, is the logarithm of the probability of the occurrence of success ($\pi_i$) in relation to the probability of the occurrence of failure $(1-\pi_i)$[9].

The ratio $\pi_1 / 1-\pi_1$ is called odds, and it is subject to the increase of one unit in the explanatory variable x. The ratio subject to the change of one unit in the explanatory variable x is designated the odds ratio, and it is represented as follows[10]:

$$\hat{O}_R = = \frac{\pi_1/1-\pi_1}{\pi_0/1-\pi_0} = e^{\hat{\beta}_j} \qquad j = 1, ..., p$$

Therefore, the odds ratio reflects the influence of the fluctuation of the values of the explanatory variable in the expected value of the response variable, which means that the addition of one unit to the value of the predictor variable corresponds to a proportional increase in the probability of the occurrence of success[10]. Therefore, $\hat{O}_R \hat{O}_R$ determines how much $\pi_i$ increases or decreases for each unit of x depending on the values of the $\beta$ coefficient[14].

Note that, in Equation 1, the response variable $y_i$ does not influence the obtaining of $\pi_i$ because the probability of success $\pi_i$ depends on only the predictor variables and a vector of unknown $\beta$ parameters[9]. These parameters are related to the response variable via the logistic function[12].

Considering that the dependent variable assumes only the values of 0 and 1, the odds ratio allows for the predicted value for the dependent variable to also assume values between 0 and 1[15]. Therefore, for each observation, the logistic regression predicts a probability value $\pi_i$ between 0 and 1 and generates a graph of predicted values, which are obtained from all values of the independent variables and the estimated $\beta$ parameters[15].

The predicted probability (expected value) is compared to a cut-off point (e.g., 0.50), which means that in cases in which it is higher than the cut-off point, we can predict that the result is

1 (the event occurred). The result is 0 (the event did not occur) in cases in which the predicted probability is less than the cut-off[15]. Considering that the response variable belongs to a binomial distribution, the relationship between the expected value $E(y_i|x_i)$ and the explanatory variables of the model is represented by the S-shaped logistic curve[15]. In the graph of the logistic curve, the Y-axis represents the expected value of the response variable $\pi_i$, and the X-axis represents the linear predictor η, which is obtained with the values of the independent variables and with the estimated β coefficients[15].

Therefore, "with an estimated logistic curve, we can estimate the probability of any observation on the basis of the values of the independent variables and then predict the significance to the group using a cut-off value"[15]. The logistic curve indicates that for very low values of the linear predictor (given by $x_i$ and the estimated β parameters), the probability of the occurrence of the event approaches 0; and when the values of the independent variables increase, the Y values increase above the curve[15]. This correlation between the dependent variable (represented on the Y axis) and the independent variable (represented on the X axis) can be observed in the graph by the scattered points located in the upper and lower region of the logistic curve.

The resulting points of $n_i$ observations are dispersed near the logistic curve, following the variability of the distribution of the values of y for each value of $x$[16]. Depending on the variability of the explanatory variables, the estimated logistic curve disperses or approaches its mean $\pi_i$ value, decreases when $\pi_i$ tends toward 0, and increases when $\pi_i$ tends toward 1[16].

The logistic curve and the unknown β parameters $\beta_0$, $\beta_1$, ... $\beta_n$ are estimated from sample $y_i$ and $x_i$ data to provide to the points $(\eta; \pi_i)$ the best adherence to the actual logistic curve, resulting in the best model to explain the occurrence of a phenomenon under study[16]. Because of the qualitative nature of the dependent variable and the use of the logit transformation in the logistic regression model, the most widely used method for estimating the parameters $\beta_0$, $\beta_1$, ... $\beta_n$ is the maximum likelihood model, which estimates the value of β and maximizes the likelihood function, as follows[7,15]:

$$L(\beta) = \prod_{i=1}^{n} \pi i_i^{y_i} (1 - y_i)^{1-y_i} L(\beta) = \prod_{i=1}^{n} \pi i_i^{y_i} (1 - y_i)^{1-y_i}$$

Based on the previously aforementioned function, after some transformations it is possible to obtain the maximum likelihood function:

$$L(\beta) = \sum_{i=1}^{n} \left[ y_i (\beta_0 + \beta_1 x_i) - \ln\left(1 + exp\left((\beta_0 + \beta_1 x_i)\right)\right) \right]$$
$$L(\beta) = \sum_{i=1}^{n} \left[ y_i (\beta_0 + \beta_1 x_i) - \ln\left(1 + exp\left((\beta_0 + \beta_1 x_i)\right)\right) \right]$$

The estimation of the parameters of the logistic regression model requires obtaining a model whose explanatory variables are significant, i.e., whose estimated β parameters differ from zero $(\beta \neq 0)$. Among the strategies for assessing the quality of the model fit, the deviance function has been used to compare the model investigated to the best possible model (saturated model) on the basis of the logarithm of the likelihood function[7,11], as described by the following expression:

$$D = -2ln\left[\frac{verossimilhança\ do\ modelo\ ajustado}{verossimilhança\ do\ modelo\ saturado}\right]$$

$$D = -2ln\left[\frac{likelihood\ of\ the\ fitted\ model}{likelihood\ of\ the\ saturated\ model}\right] D = -2ln\left[\frac{likelihood\ of\ the\ fitted\ model}{likelihood\ of\ the\ saturated\ model}\right]$$

which results in the following $D$ statistic:

$$D = -2\sum_{i=1}^{n}\left\{y_i \log\left(\frac{\hat{\pi}_i}{y_i}\right) + (1 - y_i)\log\left(\frac{1-\hat{\pi}_i}{1-y_i}\right)\right\} D = -2\sum_{i=1}^{n}\left\{y_i \log\left(\frac{\hat{\pi}_i}{y_i}\right) + (1 - y_i)\log\left(\frac{1-\hat{\pi}_i}{1-y_i}\right)\right\}$$

The minimum value of the $D$ statistic is 0, which corresponds to a perfect fit, i.e., the best possible model[15]. The null model (saturated model) does not contain independent variables and is compared to the proposed model, which contains independent variables that are to be included in the logistic regression model[15]. Statistical tests are used, including the chi-square test, to assess the significance of the difference between the best model and the proposed model[15].

Under the null hypothesis that the estimated parameters do not show significance ($\beta = 0$) and the alternative hypothesis that these parameters are significant ($\beta \neq 0$), the $D$ statistic is compared to the chi-square ($X^2$) value (associate with a given level of significance and n-p degrees of freedom)[13]. If the null hypothesis is not accepted, then the set of independent variables is significant for the estimation of the model, and consequently, these variables can significantly explain the occurrence of the phenomenon under study[15].

**Population and study site**

The study was conducted at the Police Station Specialized in Assistance to Women (Delegacia Especializada em Atendimento à Mulher – DEAM) in the city of João Pessoa, state of Paraiba, Brazil. The population consisted of women who experienced domestic violence in the past 12 months and filed complaints at the DEAM about domestic violence between April and August 2012; or women who went to the DEAM for other reasons, including to testify for or to accompany a friend or relative, but who did not suffer aggression by an intimate partner in the past year.

Therefore, the following two groups were formed: an interest group, composed of women who experienced domestic violence, and another group of women who did not experience domestic violence for at least one year. The data from both groups were obtained using a questionnaire and were compared to determine the factors associated with the occurrence of domestic violence.

Considering the difficulty in knowing the women population size that is exposed to violence in the city of João Pessoa and pondering that the official figures may be underestimated - due to concealing the occurrence of violence by victimized women -, the study's sample size was obtained through sample sizing for finite population, as described by the following equation:

$$n = \frac{z_{GC}^2 \cdot p \cdot q\, N}{e^2\,(N-1)+z_{GC}^2 \cdot p \cdot q} n = \frac{z_{GC}^2 \cdot p \cdot q\, N}{e^2\,(N-1)+z_{GC}^2 \cdot p \cdot q}$$

*p* corresponds to the sample proportion and *q* = 1 – p; *e* designates the absolute margin of error; and $Z^2_{GC}$ is a critical value or z-score associated with a confidence level established by the researcher (typically 90%, 95%, or 99%)[8]. The sample size N was obtained in this study via a previous study conducted by the authors, who found the occurrence of 734 cases of domestic violence in 2010. The use of the formula with the *p* estimate aims to estimate the percentage of women exposed to violence.

Considering *p* = *q* = 0,5, an error of 5%, and a confidence level of 95%, i.e., **α** = 0.05, a sample size of 252 individuals was obtained. After data collection, the number of women interviewed reached the minimum number of participants necessary for a sample size with an error of 5%.

Considering the difficulty in obtaining a sample from a population that is more easily recognized when reports of violence are filed with the DEAM, the participants were selected by convenience sampling. The participants were selected at the DEAM when they filed reports in the period assigned to data collection (from April to August of 2012) and included women older than 18 years of age who experienced or not any type of aggression by a male partner with whom they maintained affective relations (including a partner, ex-partner, spouse, former spouse, boyfriend, or ex-boyfriend), who agreed to participate in the study, and who signed the free and informed consent form.

**Data collection instrument**

Data were obtained using a questionnaire. The topics considered in the questionnaire were addressed on the basis of the statements collected using a qualitative survey, of which the present study is an extension. The questionnaire contained 42 independent variables related to the women and the partners, including age, marital status, number of children, profession, income, religion, ethnicity, educational level, duration of the relationship with the partner, living under situations of violence in the family and during childhood, previous history of domestic violence, and use of alcohol and illicit drugs.

**Procedures and data processing**

After collection, the data obtained with the questionnaire were revised and transformed into categorical variables. The study variables were determined to test the null hypothesis (β = 0) that personal, social, and economic factors were not correlated with the increased likelihood of domestic violence against women.

The data were entered into an Excel spreadsheet, checked for possible errors or inconsistencies during questionnaire completion or data entry and categorized as shown in Tables 1 and 2. The response variable was coded with only two values: the value of 1 when domestic violence occurred and 0 when domestic violence did not occur. All explanatory variables were categorized, except the variables of age, duration of the relationship with the partner, and number of children (Table 3).

The variables were classified as follows: ethnicity—white, mixed, black, and other; marital status—single, married, divorced, widowed, and separated; educational level—illiterate or literate, complete or incomplete primary education, complete or incomplete secondary education, complete or incomplete higher education, and graduate education; profession—unemployed, student, paid job, and retired or pensioner; income—less than ½ times the minimum wage, ½ to 1½ times the minimum wage, 1½ to 2½ times the minimum wage, 2½ to 3½ times the minimum wage, and more than 3½ times the minimum wage; religion—Catholic, evangelical, spiritism, and other; use of drugs and alcohol—yes, no, and does not know; previous history of violence—yes and no; and history of violence in the family and during childhood—yes, no, and does not know.

Note that the category of single included women or men in an unofficial but stable relationship and that the variable of ethnicity was self-reported. Each explanatory variable was represented by an abbreviation, as shown in Tables 1, 2, and 3.

After the categorization of the variables, statistical analysis was conducted. Logistic regression was performed using the open source and free statistical package R version 2.13.0. This tool was used in the development of a statistical model containing the response variable and significant explanatory variables.

Considering the number of independent variables (23) and their respective categories or factors, was conducted a simple logistic analysis between the response variable and each explanatory variable to individually test the existence of a significant correlation between the variable tested and the variable of interest. During the fitting of the simple regression model, the variables whose p-values > 0.05 did not reject the null hypothesis and were excluded from the model. The variables whose p-values were < 0.05 rejected the null hypothesis and were included in the model.

After defining the variables that should be included in the initial model (model 1), the parameters of the independent variables were jointly estimated and tested for significance. After estimation, model 1 was fitted by selecting significant explanatory variables. During fitting, the variables whose p-values were < 0.05 rejected the null hypothesis ($\beta = 0$) and were maintained in the model; those whose p-values were > 0.05 did not reject the null hypothesis ($\beta = 0$) and were excluded from the model. These steps were followed in sequence such that the exclusion of each variable defined a new model until the final model (model 9) was reached, as shown in Table 1.

During model fitting in the multivariate analysis, the variables of "duration of the relationship with the partner" (DURW), "income of the woman" (INCW), "educational level of the male partner" (EDUM), "number of children of the male partner" (NCHM), "ethnicity of the woman" (ETHW), "violence in the childhood of the male partner" (VCH), "religion of the male partner" (RLGM), and "occupation of the male partner" (OCCM) were sequentially excluded. After the selection of the variables, the final model obtained contained five predictor variables, which together had a significant correlation with the response variable.

*Table 1. Fitting of the logistic regression model and development of the final model*

| Fitting of the logistic regression model | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| (1) Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 | Model 8 | (2) Model 9 |
| DURW | - | - | - | - | - | - | - | - |
| INCW | INCW | - | - | - | - | - | - | - |
| EDUM | EDUM | EDUM | - | - | - | - | - | - |
| NCHM | NCHM | NCHM | NCHM | - | - | - | - | - |
| ETHW | ETHW | ETHW | ETHW | ETHW | - | - | - | - |
| VCH | VCH | VCH | VCH | VCH | VCH | - | - | - |
| RLGM | RLGM | RLGM | RLGM | RLGM | RLGM | RLGM | - | - |
| OCCM | OCCM | OCCM | OCCM | OCCM | OCCM | OCCM | OCCM | - |
| OCCW | OCCW | OCCW | OCCW | OCCW | OCCW | OCCW | OCCW | OCCW |
| PHV | PHV | PHV | PHV | PHV | PHV | PHV | PHV | PHV |
| CVSM | CVSM | CVSM | CVSM | CVSM | CVSM | CVSM | CVSM | CVSM |
| INCM | INCM | INCM | INCM | INCM | INCM | INCM | INCM | INCM |
| VFMM | VFMM | VFMM | VFMM | VFMM | VFMM | VFMM | VFMM | VFMM |

*(1) Initial model containing the gender-related independent variables that were significant in the simple logistic analysis. (2) Adjusted final model containing the gender-related independent variables that explained the occurrence of domestic violence.*

After defining the logistic regression model (model 9), the quality of the fit was assessed with the global goodness-of-fit test using deviance and the *D* statistic. The test made it possible to compare the proposed model (model 9) to an ideal model to assess whether the similarity between them was sufficiently significant to accept it as adequate for explaining the occurrence of the response variable considering a set of selected explanatory variables. For this purpose, the deviance value divided by the dispersion parameter of the model was compared to the chi-square value ($X^2$) at the 95% confidence interval.

Under the null hypothesis that there was no significance in the parameters of the variables adopted, the test indicated that the deviance value (290.0449) was lower than the chi-square value (325.3741), which led to the rejection of the null hypothesis and confirmation that all of the independent variables of the model could explain the occurrence of domestic violence in the study group.

The estimation of the β coefficients in the final model enabled the odds ratio (OR) for each independent variable to be obtained. The OR assigned values that indicated the influence of the fluctuation of the values of an explanatory variable in the expected value of the response variable, as shown in the results. Therefore, the calculation of the OR allowed for the assessment of the correlation between social, economic, and personal factors and domestic violence.

**Ethical aspects**

This study sought to meet the guidelines and regulatory standards for human research that were approved by the Brazilian National Health Council and established in Resolution No. 466 of December 12, 2012, considering the five basic principles of bioethics: autonomy, non-maleficence, beneficence, justice, and equality[17]. The study was drawn from a dissertation titled "Factors associated with domestic violence in the city of João Pessoa, Paraíba", whose author was a fellow of the Coordination for Improvement of Higher Education Personnel (Coordenação de Aperfeiçoamento de Pessoal Nível Superior – CAPES). The present study is an extension of a qualitative study presented in 2010 as a Completion of Course Work and approved by the Human Research Ethics Committee of the Lauro Wanderley University Hospital (Hospital Universitário Lauro Wanderley – HULW) under protocol no. 431/09.

**RESULTS**

In this study, 325 interviews were conducted, of which 34 were eliminated because of the withdrawal of the participants during the interview or because they provided incomplete information. Of the 291 participants included, 206 women had experienced domestic violence, and 85 women had not experienced domestic violence in the past year.

The simple logistic regression analysis between the response variable and each of the 23 explanatory variables indicated significance ($p < 0.05$) in 13 predictor variables, including five related to the women—ethnicity, occupation, income, duration of the relationship, and previous history of violence (Tables 1 and 3)—and eight related to the male partners—marital status, educational level, occupation, income, number of children, religion, and history of violence in the family and during childhood (Tables 2 and 3).

After the fitting of the logistic model, the multivariate analysis provided a final model containing only five predictor variables, including two related to women—profession and previous history of violence—and three related to the male partners—marital status, income, and occurrence of violence in the family.

The fit of the final model indicated that for women, being retired or a pensioner ($p = 0.00593$) was a protective factor against violence. By contrast, previous experience of violence ($p < 0.001$) was a risk factor for experiencing new episodes of violence. For the male partners, being married ($p = 0.02313$) was a protective factor against violence. An income lower than 2.5 times the minimum wage ($p = 0.02332$) or a history of violence in the family ($p = 0.02264$) were risk factors for practicing aggression against the partner. Therefore, the fitting of the multivariate logistic regression model made it possible to identify the variables that involved social, economic, and personal factors among women and men and that were correlated with a higher probability of the occurrence of domestic violence.

For the male partners, there was an approximate two-fold decrease in the likelihood of practicing aggression against a partner when they were married. An income lower than 2.5 times the minimum wage or a history of violence in the family involved a 2.02-fold and 2.06-fold increase in the likelihood of practicing domestic violence, respectively.

Table 1. Coefficients, standard deviations, and p.values of the categorical explanatory variables related to women using simple logistic analysis.

| *Variable/categories | Categories after fitting the multivariate logistic model | | Coefficients (standard deviation) | p.value |
|---|---|---|---|---|
| Ethnicity (ETHW)<br>1 White<br>2 Mixed<br>3 Black<br>4 Indigenous | 1<br>0 | Mixed or Black<br>White or other ethnicities | 0.5744<br>(0.2649) | **<br>**0.030** |
| Civil status (CVSW)<br>1 Single<br>2 Married<br>3 Divorced<br>4 Widowed<br>5 Separated | 1<br>0 | Married<br>Not married | −0.4805<br>(0.2836) | 0.090 |
| Educational level (EDUW)<br>1 Complete/Incomplete higher education<br>2 Complete/Incomplete secondary education<br>3 Complete/Incomplete primary education<br>4 Literate or illiterate<br>5 Graduate education or does not know | 1<br><br><br>0 | Complete or incomplete secondary education or complete higher education<br>Others | −0.3178<br>(0.2786) | 0.254 |
| Occupation (OCCW)<br>1 Unemployed<br>2 Student<br>3 Paid activity<br>4 Retired or pensioner | 1<br>0 | Retired or pensioner<br>Others | −1.8038<br>(0.7028) | **0010 |
| Income (INCW)<br>1 < ½ × minimum wage<br>2 ½ to 1½ × minimum wage<br>3 1½ to 2½ × minimum wage<br>4 2½ to 3½ × minimum wage<br>5 > 3½ × minimum wage | 1<br>0 | <2½ × minimum wages<br>> 2½ × minimum wages | 0.7343<br>(0.2877) | **<br>**0.010** |
| Religion (RLGW)<br>1 Catholic<br>2 Evangelical<br>3 None<br>4 Others | 1<br>0 | Evangelical<br>Other religions | −1.1494<br>(0.6837) | 0.092 |
| Violence in the family (VFMW)<br>1 Witnessed violence in the family<br>2 Did not witness violence in the family | 1<br>0 | Violence in the family<br>Absence of violence in the family | 0.001848<br>(0.259295) | 0.994 |
| Previous history of violence (PHV)<br>1 Experienced violence previously<br>2 Did not experience violence previously | 1<br>0 | Previous history violence<br>Absence of previous history of violence | 1.6409<br>(0.2785) | **<br>**3.83e-09** |

Note: In the simple logistic analysis, the relevant categories were coded as 1, and the remaining categories were coded as 0. *Variables subjected to simple logistics analysis. **Significant categories after simple logistic analysis using the women-related variables.

Table 2. Coefficients, standard deviations, and p.values of the categorical explanatory variables related to the male partners using simple logistic analysis.

| *Variable/categories | | Categories after fitting the univariate logistic model | | Coefficients (standard deviation) | p.value |
|---|---|---|---|---|---|
| Civil status (CVSM) | | | | | |
| 1 | Single | | | | |
| 2 | Married | 1 | Married | −0.6765 | ** |
| 34 | Divorced | 0 | Not married | (0.2681) | 0.0116 |
| 5 | Widowed | | | | |
| | Separated | | | | |
| Education (EDUM) | | | | | |
| | Complete or incomplete higher education | 1 | Complete or incomplete secondary education or complete higher education | | |
| 1 | Complete or incomplete secondary education | | | −0.5611 | ** |
| 2 | | | | (0.2618) | 0.0321 |
| 3 | Complete or incomplete primary education | | | | |
| 4 | | 0 | Others | | |
| 5 | Literate or illiterate | | | | |
| | Graduate education or does not know | | | | |
| Occupation (OCCM) | | | | | |
| 1 | Unemployed | 1 | Retired or pensioner | −1.0830 | ** |
| 2 | Student | | | (0.5347) | 0.0428 |
| 3 | Paid activity | 0 | Others | | |
| 4 | Retired or pensioner | | | | |
| Income (INCM) | | | | | |
| 1 | < ½ × minimum wage | | | | |
| 2 | ½ to 1½ × minimum wage | 1 | <2½ × minimum wage | 0.6831 | ** |
| 3 | 1½ to 2½ × minimum wage | 0 | > 2½ × minimum wage | (0.2756) | 0.0132 |
| 4 | 2½ to 3½ × minimum wage | | | | |
| 5 | > 3½ × minimum wage | | | | |
| Religion (RLGM) | | | | | |
| 1 | Catholic | | | | |
| 2 | Evangelical | 1 | Catholic | −0.5383 | ** |
| 3 | None | 0 | Other religions | (0.2598) | 0.0383 |
| 4 | Others | | | | |
| Drug abuse (DRUG) | | | | | |
| 1 | Uses illicit drugs | 1 | Uses illicit drugs | | |
| 2 | Does not use illicit drugs | | | 16.7723 | 0.986 |
| 3 | Does not know | 0 | Does not use illegal drugs or does not know | (932.48) | |
| Alcohol abuse (ALCO) | | | | | |
| 1 | Uses alcohol | 1 | Uses alcohol | −0.03474 | 0.893 |
| 2 | Does not use alcohol | 0 | Does not use alcohol | (0.25787) | |
| Violence in the family (VFMM) | | | | | |
| 1 | Witnessed violence in the family | 1 | Violence in the family | 1.0035 | ** |
| 2 | Did not witness violence in the family | 0 | Absence of violence in the family or does not know | (0.2915) | 0.0005 |
| 3 | Does not know | | | | |
| Violence in childhood (VCH) | | | | | |
| 1 | Experience violence in childhood | 1 | Violence in childhood | 0.7707 | (2) |
| 2 | Did not experience violence in childhood | 0 | Absence of violence in childhood | (0.3495) | 0.0274 |
| 3 | Does not know | | | | |

Note: In the simple logistic analysis, the relevant categories were coded as 1, and the remaining categories were coded as 0. *Variables subjected to simple logistics analysis. **Significant categories after simple logistic analysis using the male partner-related variables.

Table 3. Coefficients, standard deviations, and p.values of continuous explanatory variables related to women and the male partners using simple logistic analysis.

| Continuous variable | Coefficients (standard deviation) | p.value |
|---|---|---|
| Age of the woman (AGEW) | −0.02295 (0.01181) | 0.051915 |
| Number of children of the woman (NCHW) | −0.2922 (0.2854) | 0.306 |
| Duration of the relationship with the male partner (in years) (DURW) | −1.0222 (0.3710) | *0.00586 |
| Age of the male partner (AGEM) | −0.0183 (0.0103) | 0.0773 |
| Number of children of the male partner (NCHM) | −0.7116 (0.3430) | *0038 |
| Number of extramarital children of the male partner (NCHM2) | 0.05376 (0.07114) | 0.45 |

*Significant continuous variables after simple logistic analysis using independent variables related to women and the male partners.

Table 4. Final model and odds ratio (OR) of the independent variables evaluated in the multivariate logistic regression analysis.

| Final model | Coefficient | Standard error | p.value | OR | 95% CI |
|---|---|---|---|---|---|
| *Occupation: Retired or pensioner | −2.1969 | 0.7985 | 0.00593 | 0.1111464 | 0.023–0.531 |
| *Previous history of violence | 1.6060 | 0.2994 | 8.11e-08 | 4.9829605 | 2.771–8.960 |
| **Civil status: Married | −0.6857 | 0.3019 | 0.02313 | 0.5037429 | 0279–0910 |
| **Income: < 2½ × minimum wage | 0.7047 | 0.3107 | 0.02332 | 2.0231556 | 1.100–3.719 |
| **History of violence in the family | 0.7241 | 0.3177 | 0.02264 | 2.0628372 | 1.106–3.845 |

*Independent variables related to women. **Independent variables related to the male partners. 95% CI: 95% confidence interval. OR: Odds ratio.

The definition of the final model made it possible to obtain the OR values that indicated the likelihood of the independent variables to increase or decrease the probability of the occurrence of domestic violence, as shown in Table 4. The results indicated an almost nine-fold decrease in the likelihood of experiencing violence when women were no longer unemployed or students or no longer had a paid job and retired or became pensioners. The probability of experiencing new episodes of violence involved a 4.98-fold increase when women had experienced previous violence.

**DISCUSSION**

The results of the multivariate logistic analysis reveal that the characteristics that best explained the occurrence of domestic violence in the study group were occupation, a previous history of violence, and factors involving the male partner, including marital status, income, and a history of family violence.

A total of 71.35% of the women who were victims of domestic violence had a paid job at the time of the interview, and only 1.45% were retired or pensioners. Although these women had an income, approximately 90% of those who were abused earned less than 2.5 times the minimum wage. In this context, the statistical analysis indicates that compared to other statuses such as being unemployed, being a student, or having a paid job, being retired or a pensioner decreased the likelihood of domestic violence possibly because the type of occupation provided greater financial stability for this study group.

Although not present in the final model, income is also found to be a risk factor for domestic violence when women had a compensation of up to 2.5 times the minimum wage. These results are similar to those of a Brazilian study conducted in the state of Espírito Santo, where most of the victims of aggression reported having an income between 1 and 3 times the minimum wage[18], and this result has also been observed in other studies[19,20]. Low-paid occupations include domestic worker, kitchen-maid, and house cleaner[20,21].

With regard to socioeconomic status, a German study reported a trend toward the occurrence of physical violence practiced by intimate partners against women who lived in poverty and who had a low socioeconomic status and low income[22]. In that context, the economic dependence of women on the companion, added to the children number and lack of social support were considered responsible for elevating their vulnerability to suffer violence, and may hinder liberation from oppression[19,23].

Other studies have indicated that the level of education is a predisposing factor for the occurrence of domestic violence against women, especially when the level of education is low[19,24]. This result has also been observed in a study conducted in Rio de Janeiro, wherein most of the abused women who filed a complaint between 2003 and 2008 at the specialized police station only had completed primary education[21]. Another study conducted in the state of Rio Grande do Sul reports that among the women who filed a complaint about violence in the specialized police station, 63.2% did not have secondary education[25].

With regard to the male figure, negative statistical relationship was demonstrated between the practice of aggression against the companion and education level above incomplete secondary education, and having an income of up to 2.5 times the minimum wage involves a two-fold increase in the likelihood of domestic violence against women. It was also demonstrated that 57.1% of

those perpetrating domestic violence had some kind of employment, notwithstanding, 71.4% had achieved complete primary education [18].

Poverty is a major triggering factor of family conflicts that may lead to domestic violence against women. Hunger, leisure deprivation, education, and low quality of life cause emotional and affective instability among family members and favor the development of conflicts between male and female partners[25]. The disagreements can be generated due to the cultural demand on economic provision conferred on men and the need for women to complement and often dominate the economic sustenance of the family[23].

Living in poverty potentiates feelings of stress, frustration, and inadequacy in some men because they cannot fulfill the culturally defined role of provider, and these feelings may trigger violence[27]. In the construction of gender identity, men are traditionally assigned the role of family providers, and women are expected to be economically dependent on men. The reversal of these functions is a transgression of traditional gender norms, and consequently, in places where these norms are not yet adapted to the new reality of women's economic freedom (particularly in rural areas), the greater financial autonomy of women is considered a risk factor for domestic violence against them[23]. Therefore, the "entry of women into the labor market" is also a factor that "destabilizes the marital relationship that is based on differences"[28].

Some researchers explain that, "in crises or situations involving the threat of disruption of this traditional domination, behaviors related to the regaining of lost power and authority or simply to behaviors intended to prevent this loss are not only possible but necessary in the symbolic universe of hegemonic masculinity"[29]. In contexts in which economic independence valorizes women, the achievement of independence appears to be an important strategy to prevent and curb violence against women[23].

Considering that the acts inflicted against individuals can be recognized as violence considering the nuances dictated by the cultural context, family interactions involving the occurrence of violence at some point in the formation of male and female identities can increase the risk of domestic violence against women. Therefore, men who did not have healthy relationships with their parents during childhood, who lived with situations of violence (i.e., witnessed its occurrence or suffered abuse from parents or guardians), and who lived in an environment marked by a lack of dialogue, paternal authoritarianism, and maternal submission can reproduce violence in their social relationships and marriage[30].

In this context, a study involving 790 women who were assaulted by an intimate partner indicates that living with violence was strongly associated with behavioral problems in their children[31]. On the other hand, in homes characterized by healthy relationships between parents (or other adults) and children, family harmony appears to be a protective factor against antisocial behavior[32].

Having witnessed at least one event of violence between family members has been identified as a risk factor for domestic violence against women. One study demonstrates a positive correlation between the occurrence of violence against women and the existence of violence in the family of the perpetrator of aggression[21]. The analysis of the history of family violence among abused women indicated a significant correlation between the occurrence of physical abuse and having witnessed aggression against their mothers committed by intimate partners[31].

The fact that woman had suffered previous violence committed by any person in the domestic context was also revealed as a significant factor for suffering current marital violence. Most women who suffered aggression and denounced the occurrence in the specialized police service report having been assaulted previously[18,34]. In this context, women who have experienced physical violence at some point in their lives are 29% more likely to be sexually abused by their partners compared to those who have not experienced this type of abuse[30].

The recurrence of aggression causes a reoccurrence of complaints by women at specialized police stations in 25.2% of the violence cases recorded[25]. One of the reasons women stay in marital relations with the recurrence of violence, in most cases investigated, has been "the desire to maintain family unity in the company of their children"[35].

The results of this study were supported by those of other studies and reveal the existence of personal, social, economic, familial, and experiential factors that, in the formation of gender identities, can favor the occurrence of domestic violence against women[22-23,26, 36-38].

The nature of the factors evaluated indicates the influence of not only individual, familial, and community-related conditions in the occurrence of domestic violence but also the conditions generated by higher and indirect factors, which may interfere with the dynamics of the everyday lives of individuals. One of these factors is the existence of policies that maintain socioeconomic and gender inequalities[32].

However, the findings of the present study cannot be generalized to the entire population because the sample was selected using a non-probabilistic method; this method was chosen because of the difficulty in accessing the public considering that the population of women who have experienced domestic violence is more easily recognized when they file reports about the occurrence of aggression with the DEAM. This selection was also due to the unavailability of time as well as financial and human resources, which would have been required for obtaining an adequate probability sample.

## CONCLUSIONS

The present study finds that occupational status, such as low-income levels, and having lived with or experienced violence in childhood or in the family increase the risk of domestic violence against women. When considering these factors, we reiterate that the understanding of domestic violence should involve a multifactorial approach, based on the acknowledgment of the problem as

an event that is influenced by personal, social, economic, and cultural aspects of women and men.

By acknowledging that individual, interpersonal, community-related, and social situations can determine violent acts by men against their partners, it is understood that the health sector alone cannot provide meaningful answers to the fight against violence. Therefore, this sector must be included in a broad intersectoral project in pursuit of a common goal—reducing, controlling, and preventing violence.

In the health sector, particularly in Brazil, the efforts against violence to date have not achieved the desired effectiveness. One reason has been the limited knowledge of the complex factors associated with the increase in the vulnerability of women to male oppression; however, this knowledge is a powerful tool for directing strategies in the area of violence prevention.

The knowledge of the factors that increase the chance of domestic violence against women can support policy makers in the selection of strategies related to the efficient control of violence. Study results may also subsidize health professionals, especially those in the basic care, in recognizing women who are at risk to suffer spousal abuse, for offering preventive actions.

In this context, these knowledgeable professionals can create a network to support susceptible women. The development of this network requires multidisciplinary and interdisciplinary actions that, in addition to offering health care, provide social, legal, and economic support. Therefore, we reiterate the importance of this topic and the scope of the study in the current health context because we still need to understand, recognize, and appropriately intervene in cases of domestic violence.

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Jackeline Abilio de Souza, Ana Tereza de Medeiros, and Ulisses Umbelino dos Anjos contributed to all of the development phases of the research: the design, analysis, and data interpretation, the manuscript preparation and critical review, and the approval of the final version of the manuscript.