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Examining the Effects of Domestic Violence and Anemia on Maternal and Child Health in Peru

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ABSTRACT

The study aims to examine the association between domestic violence against women and anemia in women and their children under 5 years in Peru. A cross-sectional study was conducted using data from the 2023 Demographic and Family Health Survey (ENDES) in Peru, focusing on women aged 15-49 years who reported having children aged 5 years or younger. Domestic violence was defined as physical, psychological, or sexual abuse perpetrated by a partner or husband. Anemia was assessed through blood tests measuring hemoglobin levels. Two outcomes were evaluated: Model 1 (both the woman and her child are anemia-free; 1 = both anemia-free, 0 = at least one is anemic) and Model 2 (at least the child is anemia-free; 1 = child is anemia-free, 0 = child has anemia). Multivariate logistic regression analysis was used to estimate both unadjusted and adjusted odds ratios for the association between domestic violence and anemia in women and children. The most usual form of partner violence against women was psychological violence, with 44.5% of women reporting exposure. The maternal-child anemia index showed that 64.3% of woman-child pairs had at least one anemic member, and 32.6% of children under 5 were anemic among women reporting all forms of violence. In adjusted Model 1, anemia was significantly associated with physical violence (aOR = 0.72, 95% CI: 0.61, 0.85; p-trend = <0.000); and in adjusted Model 2, anemia in children was significantly associated with sexual violence (aOR = 0.60, 95% CI: 0.38, 0.95; p-trend = 0.028). These findings indicate that domestic violence is a critical determinant of health outcomes. The association between violence and anemia highlights the instrumental health benefits of addressing partner violence, with the potential to improve both maternal and child health outcomes.

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Introduction

Domestic violence is one of the most common forms of violence perpetrated by men, whether as husbands or partners, against women within the private sphere or family unit [1]. Although it occurs inside the household, its repercussions make it a significant public health issue. According to the United Nations General Assembly's "Declaration on the Elimination of Violence Against Women" (1993), this type of violence can be classified as physical, sexual, and psychological. Domestic violence against women is considered one of the most important public health problems in recent years due to its negative impact on both the physical and mental health of women, as well as the excessive use of healthcare services [2]. It also involves the provision of healthcare services and information, which requires a structured health system to recognize and address protocols without re-victimizing women [3].

Annually, 26% of women in the world experience violence from their partners [4]. By 2023, 53.8% of these women were subject to domestic violence in Peru, with 51.2% of women having children under 5 years old. This figure is even more alarming in rural areas, especially in Apurimac, where the prevalence of domestic violence exceeds the national average by 13.6 p.p. The costs of this violence are numerous and tangible, affecting the well-being of women across various dimensions. Evidence has documented its impact on income, labor market participation, education, and health and nutritional status of both women and their children [5-11].

Domestic violence against women has detrimental effects on their health, which is directly linked to the healthy development of their children [12]. This transmission pathway can be observed through an intergenerational health mechanism between the mother and child, establishing a link between the mother and child during pregnancy, childbirth, postpartum, and breastfeeding, extending into the child's early years [13,14]. In this context, the "mother" factor becomes relevant in transmitting capabilities for the future development of both the child and the mother, with both being key goals of development. One of the most concerning effects of this intergenerational transmission is childhood anemia, which can be traced back to maternal malnutrition during pregnancy. Medical literature has indicated that iron deficiency in pregnant women increases the risk of low-birth-weight deliveries, which in turn increases the likelihood of childhood anemia [15,16]. Inadequate maternal nutrition during pregnancy compromises fetal development and newborn health [17].

In this context, the present study aims to analyze the relationship between domestic violence against women and maternal-child

anemia in Peru, considering the intergenerational mechanisms of health transmission. Using a quantitative methodology based on a logistic model, this study seeks to provide empirical evidence on the association between violence and maternal and child health. Understanding this relationship is crucial for the design of public policies that address gender-based violence from a public health perspective to mitigate its effects on child development and women's well-being.

Methods

This descriptive and cross-sectional study includes women aged 15 to 49 years and children aged 0 to 5 years, recorded in the 2023 Demographic and Family Health Survey (ENDES) [18]. No sampling techniques were applied, as the entire available population in the dataset sample not weighted consisted of 17,376 women. This information was analyzed at the national level, and the expansion factor consistent with the theoretical framework of ENDES was considered.

To measure the indicators, two key variables were developed: domestic violence and maternal-child anemia, which were calculated from various sociodemographic variables in the dataset. Domestic violence was identified through an indicator that includes sexual, psychological, and physical violence. Meanwhile, the maternal-child anemia index (Figure 1) was defined according to the World Health Organization's guidelines, considering hemoglobin levels in women and children below the normal threshold. To analyze the relationship between these phenomena, a multivariate logistic regression model was employed to identify factors associated with domestic violence and its impact on the anemia index in the maternal-child population.

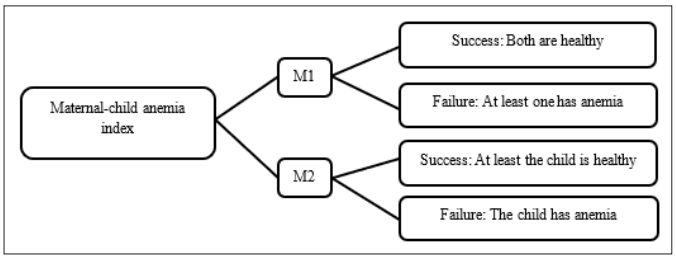

Figure 1: Maternal-Child Anemia Index

To capture both joint and child-focused outcomes, we used the maternal-child anemia index. Model 1 (M1) assesses the health status of the mother-child pair, considering a positive outcome when both are in good health (non-anemic) and a negative outcome if at least one of them has anemia. This integral approach captures the joint nature of mother and child well-being, offering a new perspective on shared vulnerabilities. Model 2 (M2) represents the maternal-child health outcome commonly used by the public sector in Peru since most policies prioritize child health as the end of development. Both, M1 and M2 allow a dual analysis: M1 shows the impacts across the mother-child couple, while M2 ensures the relevance of the existing health priority. This approach enhances both the scientific consistency and practical utility of the findings.

Additional variables described in the literature associated with domestic violence and anemia were also investigated: the age of the woman during childbirth, maternal language, geographic area, wealth quintile, educational level of the woman, educational level of the partner or husband, marital status (whether the woman is married or cohabiting), and whether the woman worked in the last 12 months, women as head of her household, and basic services [7-10,19-32]. The characteristics and frequencies of these variables are detailed in Table 1. Other covariates (e.g., age, births in the past year) were initially considered in the analysis but were excluded due to high collinearity with retained variables.

Analysis was performed with Stata version 16. A multivariate logistic regression model was applied to estimate the effect of the explanatory variables on the outcome of interest. A significance level of 5% ($p < 0.05$) was considered, and 95% confidence intervals were calculated for all estimators. Potential confounding factors were selected based on the literature and the findings from an analysis of the sample's characteristics.

Results

For the statistical analysis, we included a socioeconomic and sociodemographic profile of Peruvian women with children under 5 years old. According to Table 1, 48.8% (n=7,233) of women reported experiencing domestic violence from their husbands or partners, for whom 23.2% (n=1,656) had anemia, and 32.6% (n=743) of their children under 5 were anemic. These findings highlight the significant prevalence of domestic violence and anemia in this population, which leads us to study associated sociodemographic factors.

Following a literature review and correlation analysis, several sociodemographic variables were selected as covariates for the multivariate logistic regression model to ensure a robust analysis. The area of residence showed that 75.1% (n=12,328) of women lived in urban areas, while 24.9% (n=5,048) resided in rural areas, reflecting Peru's potential geographic disparities in healthcare utilization and violence exposure. Occupation was defined as a binary variable based on whether the woman worked in the last 12 months (yes: 69.7%, n=12,022; no: 30.3%, n=5,354), capturing employment status. Marital status was categorized as married/cohabiting (81.4%, n=14,273) or other (18.7%, n=3,103), a factor relevant to household dynamics and violence risk.

Additional covariates included maternal language, head of the house, maternal age at birth, education, partner's education, wealth quintiles, electricity, and sanitation in the household. Maternal language, a proxy for ethnicity, indicated that 93.3% (n=15,752) of women spoke Spanish, while 18.7% (n=3,103) spoke an indigenous language (e.g., Quechua or Aymara). In addition, 19.6% (n=3,656) of women are heads of their families. Also, the age group of 15 to 25 years is the most prevalent among women at the time of childbirth with 78.8% (n=14,049). Maternal education was classified as early childhood/preschool (0.8%, n=157), primary (14.2%, n=2,632), secondary (47.6%, n=8,455), non-university higher education (20.7%, n=3,389), university higher education (15.2%, n=2,536), or postgraduate (1.4%, n=207), with most women having completed secondary education. Partner's education followed a similar classification, with 51.8% (n=8,755) having secondary education. Wealth quintiles, reflecting living standards, showed 24.0% (n=4,876) in the lowest quintile and 13.7% (n=1,665) in the highest, capturing socioeconomic disparities affecting nutritional status and violence risk. The latter is complemented by the presence of two household services at home: electricity and sanitat

Table 1: Sociodemographic and Sociodemographic Variables of Women Aged 15-49. Demographic and Family Health Survey (ENDES) 2023

Women analyzed		
Variable	**% (weighted)**	**n (unweighted)**
Domestic violence		
No	51.2	7,581
Yes	48.8	7,233
Sexual violence		
No	95.5	14,194
Yes	4.5	620
Physical violence		
No	76.9	11,354
Yes	23.1	3,460
Psychological violence		
No	55.5	8,241
Yes	44.5	6,573
Area		
Urban	75.1	12,328
Rural	24.9	5,048
Maternal language		
Other	6.7	1,624
Spanish	93.3	15,752
Marital status		
Other	18.7	3,103
Married or cohabitant	81.4	14,273
Occupation		
No	30.3	5,354
Yes, in the last 12 months	69.7	12,022
Decision-making autonomy of health		
No	43.1	7,543
Yes	56.9	9,833
Maternal age at birth (years)		
15-25	78.8	14,049
26-35	19.2	3,048
36-49	2.0	279
Level of education		
Early childhood/ Preschool	0.8	157
Primary	14.2	2,632
Secondary	47.6	8,455
Non-university higher education	20.7	3,389
University higher education	15.2	2,536
Postgraduate	1.4	207
Level of education of partner		
Early childhood/ Preschool	0.4	73
Primary	11.8	2,006
Secondary	51.8	8,755
Non-university higher education	19.5	3,193
University higher education	14.8	2,329
Postgraduate	1.4	211
Does not know	0.3	57
Living standard (wealth quintile)		
First (lowest)	24.0	4,876
Second	23.7	4,637
Third	20.3	3,496
Fourth	18.3	2,702
Fifth (highest)	13.7	1,665
Woman as head of household		
No	80.4	13,557
Yes	19.6	3,656
Electricity at home		
No	5.3	951
Yes	94.7	16,425
Sanitation at home		
No	10.2	1,876
Yes	89.8	15,500
No. of children		
'1	31.9	5,347
'2	33.6	5,781
'3	19.9	3,566
>=4	14.7	2,682
Births in the past year		
'0	77.9	13,431
'1	21.9	3,913
'2	0.2	32
Woman has anemia		
No	77.5	13,482
Yes	22.5	3,894
Child under 5 years old has anemia		
No	67.9	4,028
Yes	32.1	2,089
Anemia of the couple		
At least one (woman or child) is anemic	60.5	5,409
Both woman and child are anemia-free	39.5	3,342
For women exposed to all types of domestic violence		
Woman has anemia	23.2	1,656
Child under 5 years old has anemia	32.6	743
In the couple, at least one (woman or child) is anemic	64.3	2,197
Both woman and child are anemia-free	35.7	1,192

This study assesses two maternal-child models (Figure 1): a) M1: success if both woman and child are anemia-free, and M2: success if at least the child is anemia-free. In unadjusted models, all forms of domestic violence were significantly associated with a reduced likelihood of both the woman and her child being anemia-free. Sexual violence showed the strongest effect (OR = 0.57, 95% CI: 0.40, 0.81; p for trend = 0.002), followed by physical violence (OR = 0.68, 95% CI: 0.58, 0.79; p for trend < 0.000), total domestic violence (OR = 0.80, 95% CI: 0.71, 0.91; p for trend = 0.001), and psychological violence (OR = 0.82, 95% CI: 0.72, 0.93; p for trend = 0.002). For M2, only sexual violence was significantly associated with a reduced likelihood of the child being anemia-free (OR = 0.57, 95% CI: 0.37, 0.87; p for trend = 0.009), while total, physical, and psychological violence showed no significant associations. These unadjusted findings highlight the impact of domestic violence, particularly sexual violence, on anemia outcomes.

In Table 2, after adjustment for confounders, the associations in M1 remained significant but were attenuated, with occupation, maternal language, living standard, and electricity as significant covariates influencing the relationship between domestic violence and anemia. Sexual violence continued to show the strongest effect (aOR = 0.63, 95% CI: 0.43, 0.91; p for trend = 0.014), followed by physical violence (aOR = 0.72, 95% CI: 0.61, 0.85; p for trend < 0.000), total domestic violence (aOR = 0.84, 95% CI: 0.73, 0.96; p for trend = 0.009), and psychological violence (aOR = 0.85, 95% CI: 0.74, 0.97; p for trend = 0.019). In M2, only sexual violence remained significantly associated with a reduced likelihood of the child being anemia-free (aOR = 0.60, 95% CI: 0.38, 0.95; p for trend = 0.028), while total, physical, and psychological violence showed no significant associations.

The stronger associations in M1 compared to M2 indicate that domestic violence has a more consistent impact on the combined anemia status of the woman and her child than on the child's status alone, with sexual violence being the most significant risk factor across both models. These findings highlight the need for public health interventions in Peru to address domestic violence, particularly sexual violence, to effectively reduce the burden of anemia in women and children.

Table 2: Odds Ratios and 95% Confidence Intervals for Anemia, by the Report of Domestic Violence, Among Women Aged 15–49 Years in 2023 Demographic and Family Health Survey

Variable	Unadjusted		Adjusted*		Unadjusted		Adjusted*	
	OR+	95%CI+	OR	95%CI	OR	95%CI	OR	95%CI
Domestic violence (1)	M1: The woman and her child are anemia-free				M2: The child is anemia-free			
No (Reference)	1.00		1.00		1.00		1.00	
Yes	0.80	0.71, 0.91	0.84	0.73,0.96	0.96	0.82,1.11	0.96	0.82,1.13
p for trend	0.001		0.009		0.565		0.660	
Sexual violence	M1: The woman and her child are anemia-free				M2: The child is anemia-free			
No (Reference)	1.00		1.00		1.00		1.00	
Yes	0.57	0.40,0.81	0.63	0.43,0.91	0.57	0.37,0.87	0.60	0.38,0.95
p for trend	0.002		0.014		0.009		0.028	
Physical violence	M1: The woman and her child are anemia-free				M2: The child is anemia-free			
No (Reference)	1.00		1.00		1.00		1.00	
Yes	0.68	0.58,0.79	0.72	0.61,0.85	0.89	0.73,1.08	0.89	0.72,1.10
p for trend	<0.000		<0.000		0.244		0.275	
Psychological violence	M1: The woman and her child are anemia-free				M2: The child is anemia-free			
No (Reference)	1.00		1.00		1.00		1.00	
Yes	0.82	0.72,0.93	0.85	0.74,0.97	0.93	0.80,1.08	0.93	0.79,1.10
p for trend	0.002		0.019		0.346		0.414	

*Models were adjusted for rural/urban areas, maternal age at birth, occupation in the last 12 months, level of education, level of education of the husband/partner, marital status, living standard, maternal language, head of the household, electricity, and sanitation. (1) The combination of sexual, physical, and psychological violence. +OR, odds ratio; CI, confidence interval.

Discussion

Using data from the 2023 ENDES, this study examined the relationship between domestic violence against women and anemia in women and their children under five in Peru. We presented a descriptive profile for women aged 15–49 with children under five, focusing on socio-demographic characteristics, exposure to domestic violence, and maternal-child anemia. Over half of the women reported having experienced some form of domestic violence. In addition, we estimated a multivariate logistic regression to assess associations between domestic violence and maternal-child anemia.

Domestic violence, particularly sexual violence, is strongly associated with a lower likelihood of nutritional well-being for both women and their children. This association is more consistent when considering the combined mother-child anemia-free status

(M1). The variation in results across types of violence indicates that not all forms impact health in the same way. In the case of sexual violence, its traumatic nature can lead to long-lasting physical and psychological consequences, such as internal injuries or chronic stress, which interfere with iron absorption and red blood cell production [33]. Constant exposure to violence may also reduce a woman's autonomy over her health and diet, altering her eating habits and limiting timely utilization of prenatal care or adherence to iron supplementation during pregnancy. These factors negatively affect her nutritional status and, in turn, her ability to provide adequate care for her child [28]. Furthermore, children exposed to violent home environments may experience toxic stress that triggers chronic inflammatory responses, disrupting iron metabolism and the absorption of other nutrients [34]. When analyzing M2, these associations weakened and showed a limited change between unadjusted and adjusted estimates, suggesting a more indirect relation between maternal violence exposure and child anemia, which could be affected by child-directed factors such as infections, feeding practices, and others.

Our findings align with similar studies from Latin America, Asia, and Africa, that have identified associations between domestic violence and poor nutritional outcomes among women and children. For instance, women in India who experienced violence from their partners were more likely to suffer from anemia and have underweight children [35]. Other studies confirmed that violence is linked to poorer prenatal care and nutritional deficits in women, which affect child health and increase malnutrition [36-40]. However, few studies differentiate anemia outcomes in both the woman and her child, extending the evidence by highlighting different types of violence. In addition, studies have shown that domestic violence contributes to negative maternal outcomes, including low birth weight [41-43]. In Peru, a study found that women who suffer violence during pregnancy have higher odds of having newborns with low birth weight than the ones without violence exposure [44]. Our findings contribute to the literature by using a nationally representative dataset and highlighting a double burden in the women and the children that are often unmeasured.

Addressing violence against women is a public health priority that could reduce the burden of anemia and improve child development. Policies should prioritize gender approaches, ensuring that both health and social protection systems respond to the complex needs of women experiencing violence. For example, improving healthcare to screen for violence during pregnancy in prenatal check-ups could help break the cycle of abuse and its health consequences, enhancing intergenerational health outcomes.

This study has several limitations that should be acknowledged. Due to the cross-sectional design of ENDES and the way the objective was framed, we cannot establish a causal relationship between domestic violence and anemia. Specifically, while the violence was self-reported for the past 12 months, anemia is a condition that may develop over a longer period and could be influenced by earlier exposures. We are also unable to determine the duration or frequency of violence experienced, which limits our understanding of potential dose-response effects. Furthermore, some relevant confounding variables, such as maternal mental health or partner's mental health, were either not available or had substantial non-random missing data, which could bias the estimates. Despite these limitations, the plausibility and consistency of our findings with previous research suggest that domestic violence may be a significant factor affecting maternal and child nutritional outcomes.

Contributors

FI was responsible for the study conception, design, data extraction, analysis, interpretation, writing, and review, and approved the final version. PC contributed to the analysis, interpretation, writing, and review, and approved the final version. AQ was responsible for data extraction, interpretation, writing, and review; and approved the final version.

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