DOI: 10.1590/1980-549720180001

ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

Anemia and associated factors in women at reproductive age in a Brazilian Northeastern municipality

Anemia e fatores associados em mulheres de idade reprodutiva de um município do Nordeste brasileiro

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ABSTRACT: ***Objective:*** To identify the prevalence of iron-deficiency anemia and associated factors in women at reproductive age in the city of Vitoria de Santo Antão, Pernambuco. ***Methods:*** Cross-sectional study with a representative sample of 322 women aged between 15 and 49 years. Anemia was diagnosed by measuring hemoglobin below 12 g/dL. The independent variables were: demographic and socioeconomic conditions (age, race/color, education, literacy, presence of children aged < 5 years in the household, regime of residence occupation, ownership of assets, and *per capita* income), housing conditions (number of people in the household, number of bedrooms, and basic sanitation), food and nutrition security and women's health conditions (menarche, number of pregnancies, history of miscarriages, body mass index, and ferritin). Poisson regression was used to analyze the factors associated with anemia. ***Results:*** The mean age of women surveyed was 31.1 ± 6.61 years old (standard deviation – SD) and the prevalence of anemia was 18.6% (95%CI 14.7 – 23.3). After multivariate analysis, anemia was significantly associated with age ≤ 19 years and low ferritin. ***Conclusion:*** The prevalence of anemia is characterized as a mild public health problem and follows the world trend in developing countries.

Keywords: Anemia. Iron Deficiency. Epidemiology. Risk factors. Socioeconomic factors. Women.

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Conflict of interests: nothing to declare – **Financial support**: Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPQ).

RESUMO: ***Objetivo:*** Determinar a prevalência de anemia e seus fatores associados em mulheres em idade reprodutiva do município de Vitória de Santo Antão, Pernambuco. ***Métodos:*** Estudo transversal com amostra representativa de 322 mulheres, com idade entre 15 e 49 anos. A anemia foi diagnosticada pela dosagem de hemoglobina abaixo de 12 g/dL. As variáveis independentes foram: condições demográficas e socioeconômicas (idade, raça/cor, escolaridade, alfabetização, presença de crianças com idade < 5 anos no domicílio, regime de ocupação de residência, posse de bens e renda familiar *per capita*), condições de moradia (número de pessoas no domicílio, número de dormitórios e condições de saneamento básico), segurança alimentar e nutricional e condições de saúde das mulheres (menarca, número de gestações, passado de abortos, índice de massa corporal e ferritina). A regressão de Poisson foi utilizada para a análise dos fatores associados à anemia. ***Resultados:*** A média de idade das mulheres investigadas foi de 31,1 ± 6,61 anos (desvio padrão – DP) e a prevalência de anemia, de 18,6% (IC95% 14,7 – 23,3). Após análise multivariável, a anemia apresentou associação significativa com idade ≤ 19 anos e com baixo índice de ferritina. ***Conclusão:*** A prevalência de anemia encontrada se caracteriza como um problema de saúde pública de grau leve e segue a tendência mundial de países em desenvolvimento.

***Palavras-chave*:** Anemia. Deficiência de Ferro. Epidemiologia. Fatores de risco. Fatores socioeconômicos. Mulheres.

INTRODUCTION

Iron-deficiency anemia is one of the most severe and relevant nutritional disorders in the world[1], currently representing a public health problem that affects rich and poor countries[2]. The iron deficiency, when prolonged, causes iron-deficiency anemia, which is installed in three stages, characterized by the depletion of iron stores, iron-deficient erythropoiesis and iron-deficiency anemia with reduced serum levels of hemoglobin[3].

Due to the reduced concentration of blood hemoglobin, the transport of oxygen to the body tissues is compromised, causing changes in the aspect of the skin and mucosa, with consequent paleness, glossitis, fatigue, weakness, palpitation, reduced cognitive function and delayed growth and in the psychomotor development. In all stages of life, the immune system, physical and professional performance are negatively affected, and there is an increase in maternal and fetal morbidity and mortality, besides the risk of low weight at birth[1].

It is estimated that 1.62 billion people in the world have low levels of hemoglobin. In the group of non-pregnant adult women, 30.2% present with anemia. The significance of the prevalence of the condition in this population group is classified as severe in Africa (47.5%) and in Southeast Asia (45.7%), moderate in the Eastern Mediterranean (32.4%) and in the Western Pacific (21.5%), and mild in the Americas (17.8%) and Europe (19.0%)[2]. In Brazil, the most recent national data show 29.4% of women at reproductive age with anemia, highlighting the indexes found in the Northeast (39.1%) and Southeast (28.5%) regions[4].

Osório[5] reports that iron-deficiency anemia is a result of multiple factors that can co-exist negatively in a group of individuals: socioeconomic, cultural, environmental, dietary, physiological, pathological, nutritional and biological. Among these, studies conducted with

women at reproductive age report a statistically significant association between the prevalence of anemia and black skin[4,6], unfavorable socioeconomic status[7,8] and the presence of one or two children, aged from 6 to 35 months, with anemia[8]. Other factors, such as the regime of occupation in the household, lack of waste treatment, lack of prenatal care and distance of the health service were statistically related with the presence of anemia in the group of women assessed[9].

This study aimed at determining the prevalence of anemia and its associated factors in women at reproductive age in the city of Vitória de Santo Antão, Pernambuco. It is important to subsidize the increase of strategies of Dietary and Nutritional Education and to promote the adequate and healthy diet, in order to help control and reduce this problem[10].

METHODS

Cross-sectional analytical study, conducted with women at reproductive age, aged between 12 and 49 years, living in the city of Vitória de Santo Antão, located in the South region of Zona da Mata, in the State of Pernambuco. Data collection was conducted between December, 2012, and February, 2013, and the analyses were performed in March and April, 2013, using a household survey, with a structured questionnaire, applied by a properly trained technical team.

In the 2010 demographic census, the population of women aged between 15 and 49 years, living in the urban area of Vitória de Santo Antão, was of 33,362[11]. For the sample size, we considered the prevalence of anemia in women aged between 10 and 49 years in the state of Pernambuco (16.7%), obtained in the III State Study of Health and Nutrition[12]. For the calculation, the following were considered: 95% confidence interval (95%CI), maximum sampling error of around 5% in the predicted value of 16.7% of prevalence of anemia, and design effect of 1.3. We also considered an addition of 15% for possible losses, accounting for a minimum number of 320 women; 322 were assessed. For the sample calculation, the software StatCalc, from EPI-Info, version 6.04, was used.

The database was composed by the list of census sectors (n=102), made by the Demographic Census 2010 for the city of Vitória de Santo Antão[11]. The sampling plan chosen was probabilistic and stratified in two stages, as follows:

1. primary selection units: census sectors; and
2. secondary selection units: households.

Both the census sectors and the households were selected by systematic random selection. In case there was more than one woman at reproductive age in the households, a third selection was conducted.

A total of 10 census sectors were chosen to participate in the study by a simple random selection, considering 10% of the sectors in the region. The community agents in the health units belonging to the selected sector accompanied the research team by identifying

the selected households. When there were no women at reproductive age, the following household was approached.

The women were selected according to the following eligibility criteria: age group between 15 and 49 years (from menarche to menopause), living in the urban zone of the city of Vitória de Santo Antão. The following women were excluded: those at menopause or pregnant women; the ones who were breastfeeding exclusively; who had undergone total hysterectomy; who do not menstruate or have any physical limitation that prevent them from having an anthropometric evaluation.

Iron-deficiency anemia was considered as a dependent variable. As independent variables, the demographic and socioeconomic factors were considered: age, race/color, schooling, literacy, presence of children aged < 5 years in the household, regime of occupation in the household, possession of goods and family per capita income in minimum wages.

The variables related with household conditions and dietary and nutritional safety were: number of people living in the household, number of bedrooms, basic sanitation and dietary and nutritional safety. The health and anthropometric variables were: age of menarche, past of pregnancy and abortion, body mass index (BMI) and ferritin.

The standardized questionnaire was used as an instrument of data collection, applied in the households of the women who agreed to participate in the study. Data collection was conducted from December 2012 to February 2013, and the analyses were performed in March and April, 2013, by the research team.

Blood collection was conducted at a second moment, in the Health Basic Units. The diagnosis of anemia was made based on the concentration of hemoglobin (Hb < 12 g/dL) for non-pregnant adult women[2], and its value was determined by the cyanmethemoglobin method, using the ABX Micros 60 equipment, from the Horiba group. The depletion of iron stores was determined for ferritin in the studied group (ferritin < 15 μg/L)[13], and its values were calculated by the automated chemiluminescence assay, using the ADVIA Centaur CP device, from Siemens.

Weight and height were measured in duplicate, and a third measurement was made when both weight measurements differed in more than 100 g, and height, in more than 0.5 cm. Body weight was measured by an electronic digital portable scale (Omron HBF 514CC), with capacity of 150 kg and a 100 g scale. The women were placed at the center of the equipment, with minimum clothing, barefoot, straight, with their feet close together and the arms along the body. Height was determined by the portable stadiometer from Alturexata®, with a bilateral scale and field of use of 35 to 213 cm, and grading of 0.1 cm. The women were placed at the center of the stadiometer, at a straight position, barefoot, without decorations on the head, arms along the body and head up high, looking at a fixed point at the height of the eyes. As recommended, the heels, dorsum and buttocks were in contact with the wooden column and the internal bones of the heels touched, as well as the internal side of both knees[14].

For the classification of the nutritional status of women aged more than 19 years, the BMI values used were determined by the relationship weight in kg/square height in m, adopting the cutoff limits recommended by the World Health Organization (WHO)[14].

For the classification of the nutritional status of women aged less than 19 years, the software Anthro 2007 was used. Adolescents were classified by the body mass index per age (BMI/A), expressed in Z score. The reference pattern used for the classification of weight and height measurements was that recommended by WHO and by the Ministry of Health[15].

For the diagnosis of dietary safety, the Brazilian Scale Dietary Insecurity questionnaire (EBIA)[11] was used. It has 15 questions, but in the households without children and/or adolescents, 9 questions are asked. Each affirmative answer in the questionnaire corresponds to one point, and the sum of points corresponds to the scale score. In this study, the classification was given by considering the total score of the scale in the households with adolescents aged less than 18 years, as well as those who were older than 18 years: 0 (zero): dietary safety; ≥ 1: dietary insecurity.

For the creation of the database, two entries were made using the software Epi-Info 6.04, with the purpose of checking the consistency and the validation of the typing. Anemia was determined by the simple frequency.

To verify the association between anemia and the independent variables, at first there was a bivariate analysis for each level of determination, by using the simple Poisson regression, conducted with the Statistical Package for the Social Sciences (SPSS), version 8.0. Then, the Poisson regression with robust adjustments of variance was adopted to investigate the possible influence of explanatory variables over the prevalence of anemia. The associations that presented $p < 0.20$ were adjusted with models of multivariate analyses by the Poisson regression with robust variance, using the software Stata 7.0.

This procedure was carried out according to a level modelling process, initially including the socioeconomic and demographic variables (literacy, possession of assets, regime of occupation in the household, presence of children < 5 years in the household, age, race/color). In the second level, the variable ferritin was introduced. The results were expressed by crude and adjusted prevalence ratio (PR), with 95%CI. In the final model, the variables with $p \leq 0.05$ were considered to have statistical significance, and those with $p \leq 0.10$ had borderline significance.

The project was approved by the Human Research Ethics Committee, Resolution 196/96, from the National Health Council (CNS), CAAE n. 04216212.6.0000.5208. Data collection began only after the subject accepted to participate in the study by signing the Informed Consent Form, without conflict of interest. For participants who were younger than 18 years of age, the parents or tutors signed the Form. The diagnosed cases of anemia were referred for treatment in Family Health Units.

RESULTS

The sample, composed of 322 women aged between 12 and 49 years, presented mean age and standard deviation (SD) of 31.1 ± 6.61 years, and prevalence of anemia of 18.6%

(95%CI 14.7 – 23.3). However, among the 38 women who presented with low ferritin, 20 were anemic (95%CI 36.7 – 67.9).

The variables age, race/color, presence of children aged less than five years in the household, and regime of occupation in the household showed significant association with anemia (Table 1). However, the variables literacy and possession of assets presented a borderline association with the condition ($p < 0.20$). Ferritin, on the other hand, was associated with anemia (Table 2).

The adjusted PR using the multivariable Poisson regression model showed that only the variables age and ferritin were associated with anemia ($p \leq 0.05$). The variables possession of assets, regime of occupation in the household and presence of children aged less than five years in the household had a borderline association ($p \leq 0.10$) with the condition (Table 3).

Table 1. Prevalence of anemia according to demographic, socioeconomic, housing and dietary safety conditions among women at reproductive age in the city of Vitória de Santo Antão, PE, 2013.

Variables	Total		Anemic		95%CI	p-value
	n = 322	%	n = 60	%		
Age (years)						
≤ 19	191	59.3	25	13.1	8.9 – 18.7	0.004
20 – 40	77	23.9	18	23.4	15.2 – 34.2	
≥ 40	54	16.8	17	31.5	20.4 – 45.1	
Race/color						
White	71	22.0	11	15.5	8.7 – 25.9	0.040
Brown	220	68.3	38	17.3	12.8 – 22.8	
Black	31	9.6	11	35.5	20.6 – 53.8	
Schooling (years)						
0 – 4	80	24.8	16	20.0	12.5 – 30.3	0.480
4 – 8	118	36.6	18	15.3	9.7 – 23.0	
> 8	124	38.5	26	21.0	14.6 – 29.0	
Literacy						
Yes	275	86.2	47	17.1	13.1 – 22.0	0.160
No	44	13.8	12	27.3	16.0 – 42.4	

Continue...

Table 1. Continuation.

Variables	Total		Anemic		95%CI	p-value
	n = 322	%	n = 60	%		
Presence of children aged < 5 years						
Yes	213	66.1	48	22.5	17.4 – 28.7	0.020
No	109	33.9	12	11.0	0.6 – 18.5	
Regime of occupation of the household						
Own house / Being acquired / Rented	292	90.7	50	17.1	13.2 – 21.9	0.050
Granted	30	9.3	10	33.3	18.7 – 52.0	
Possession of assets[#]						
4 – 3	155	48.1	23	14.8	10.0 – 21.4	0.120
≤ 2	167	51.9	37	22.2	16.5 – 29.1	
Per capita family income						
< 0,25 MW[¤]	168	53.7	30	17.9	12.7 – 24.4	0.910
≥ 0,25 to < 0,50 MW	106	33.9	21	19.8	13.2 – 28.6	
≥ 0,50 MW	39	12.5	7	17.9	0.9 – 33.4	
Number of people in the household						
< 4 people	134	41.6	25	18.7	12.9 – 26.2	0.890
≥ 4 people	188	58.4	35	18.6	13.6 – 24.8	
Number of rooms						
1 – 3 rooms	232	72.0	40	17.2	12.8 – 22.7	0.380
≥ 3 rooms	90	28.0	20	22.2	14.7 – 32.0	
Basic sanitation condition[#]						
Access to all conditions	244	75.8	48	19.7	15.1 – 25.2	0.490
Access to 2, 1 or none	78	24.2	12	15.4	0.9 – 25.3	
Dietary safety						
Yes	177	55.0	31	17.5	12.6 – 23.9	0.670
No	145	45.0	29	20.0	14.2 – 27.4	

[#]Possession of assets: television, radio, washing mashine and computer; [¤]MW: minimum-wage; [¤]Basic sanitation condition: water supply, waste treatment.

DISCUSSION

The study of nutritional deficiencies in the female population at reproductive age is relevant as a public health issue, considering that women are among the most vulnerable groups for the development of iron-deficiency anemia, since they have high demand for iron due to regular menstrual losses[12].

The prevalence of anemia found in this study (18.6%), according to the WHO[1], is considered as a mild public health problem, being compared, in terms of population magnitude, to the prevalence rates shown by the WHO[2] in women in the same age group in the Americas (17.8%) and in Europe (19.0%), and close to the Western Pacific (21.5%).

Data from the National Survey of Demography and Health of Infants and Women[4] show more severity in the prevalence of anemia, both in the national level (29.4%) and in the Northeast region (39.1%), in women at reproductive age, in comparison to the levels found in this study. However, the prevalence rates in the North (19.3%) and Center-West (20.1%) regions, indicated by that study, are closer to the numbers found in this study.

Table 2. Prevalence of anemia according to health conditions of women at reproductive age in the city of Vitória de Santo Antão, PE, 2013.

Variables	Total		Anemic		95%CI	p-value
	n = 322	%	n = 60	%		
Age of menarche (years)						
≤ 10	21	6.5	6	28.6	13.1 – 51.4	0.350
≥ 11	301	93.5	54	17.9	14.0 – 22.7	
Past pregnancies						
Yes	248	77.0	42	16.9	12.7 – 22.1	0.200
No	74	23.0	18	24.3	15.8 – 35.5	
Past abortions						
Yes	206	64.0	37	18.0	13.3 – 23.8	0.230
No	42	13.0	5	11.9	0.5 – 25.8	
Did not get pregnant	74	23.0	18	24.3	15.8 – 35.0	
Body mass index						
Eutrophy	126	39.1	26	20.6	14.4 – 28.6	0.550
Overweight / obesity	196	60.9	34	17.3	12.6 – 23.3	
Ferritin						
Low (< 15 µg/L)	38	11.8	20	52.6	36.7 – 67.9	< 0.001
Normal (≥ 15 µg/L)	284	88.2	40	14.1	10.5 – 18.6	

On the other hand, several references point to situations that are similar to those found in this study. A cross-sectional analysis carried out in the urban zone of Pelotas, Rio Grande do Sul, found prevalence of anemia of 21.9% in women aged between 20 and 69 years[7].

Table 3. Prevalence ratio for anemia in women at reproductive age, according to socioeconomic and biological conditions, in the city of Vitória de Santo Antão, PE, 2013.

Variable	Crude PR			Adjusted PR		
	PR	95%CI	p-value	PR	95%CI	p-value
Level 1						
Literacy						
Yes	1			1		
No	1.59	0.84 – 3.00	0.150	1.87	0.92 – 3.79	0.080
Possession of assets						
4 – 3	1			1		
≤ 2	1.49	0.88 – 2.51	0.130	1.66	0.96 – 2.90	0.070
Regime of occupation of the household						
Own house/ being acquired/ rented	1			1		
Granted	1.94	0.98 – 3.83	0.054	1.70	0.88 – 3.30	0.090
Presence of children < 5 years						
Yes	1			1		
No	2.04	1.08 – 3.85	0.026	1.70	0.88 – 3.30	0.120
Age (years)						
≤ 19	2.40	1.29 – 4.45	0.005	2.36	1.24 – 4.52	0.009
20 to 40	1			1		
≥ 40	1.78	0.97 – 3.27	0.060	1.39	0.74 – 2.63	0.310
Color						
White	1			1		
Brown	1.11	0.57 – 2.18	0.750	1.14	0.58 – 2.24	0.710
Black	2.29	0.99 – 5.28	0.050	1.52	0.61 – 3.77	0.370
Level 2						
Ferritin						
Normal (≥ 15 µg/L)	1			1		
Low (< 15 µg/L)	3.73	2.18 – 6.39	0.000	2.98	1.70 – 5.23	< 0.001

PR: prevalence ratio; 95%CI: 95% confidence interval; Level 1: adjusted by the variables in module 1.

In São Leopoldo, Rio Grande do Sul, the prevalence of anemia among women at reproductive age was 21.4%[16]. In Pernambuco, in the last state survey conducte with women aged from 10 to 49 years, there was prevalence of 16.7% for anemia, being 14.3% in the urban countryside and 21.2% in the Metropolitan region of Recife[12], corroborating the findings in the city of Vitória de Santo Antão.

On the other hand, the prevalence of anemia found in this study was lower than that found in the first National Survey of Health and Nutrition of Indigenous Peoples, which indicated a prevalence of 32.7% in Indigenous non-pregnant women aged between 14 and 49 years all over Brazil, and 22.5% in the Northeast region (22.5%), demonstrating results closer to those found in this study in that region[17]. A study conducted in Teresina, Piauí, with university students aged between 18 and 45 years found 79.2% of prevalence of anemia[18].

These findings are important, once the presence of iron-deficiency anemia in non-pregnant women reduces the quality of life of this population, with consequences to health, such as: reduced work capacity, fatigue, sensation of insecurity and irritability[19]. It is also worth to mention that women diagnosed with anemia may become anemic pregnant women for having insufficient iron stores[20], which would lead to higher chances of maternal and perinatal mortality[21] and increasing risk of prematurity and low weight at birth[1,19]. Olivares and Walter[22] report that, in the pregnancy of anemic women, there are 2.6 times more risks for premature labor and 3.1 times more risks of low weight at birth.

After the adjustment in the multivariate analysis, it was observed that women aged up to 19 years presented 2.4 times more chances of developing anemia than those aged between 20 and 39 years. The prevalence of anemia among adolescents found in this study (13.1%) was lower than that obtained in an analysis conducted with children and adolescents aged between 7 and 14 years in the public education network of Salvador, Bahia (24.7%)[23], and in a study conducted with adolescent girls aged between 10 and 18 years in the education network of Balneário Camboriú, in Santa Catarina (31.1%)[24]. The lowest prevalence (7.3%) was observed in the public elementary schools in the suburbs of Vespasiano, city in Minas Gerais, in which 736 girls aged between 11 and 16 years were assessed[25].

The highest risk of anemia among adolescents in this study may be justified by the fact that this specific group is in the phase of puberty growth spurt, when there is increasing need for the intake of iron, imposed by the expansion of cellular mass and by the growth of tissues, as well as by menstrual loss, with a direct influence on metabolism and the need for iron. Besides, the is the inadequate intake of iron-rich foods, consequence of unhealthy dietary choices[25]. Therefore, the iron-deficiency intake — associated with menstrual losses and other factors — may lead to higher risks for adolescents to develop iron-deficiency anemia[26].

Women with low values of ferritin (< 15 μg/L) presented with three times more risks of having anemia than those with normal levels. However, 67% of the anemic women in this study did not have iron-deficiency anemia. A similar result was found by Bresani et al.[27], in a study conducted with pregnant women, in which almost half of the population was classified as anemic, without iron-deficiency. One of the hypotheses suggested by the authors to justify such findings consists on the fact that the etiology of the anemia, in populations with low levels

of development, would be more diversified, considering as hypotheses the presence of iron-deficiency, chronic disorders, endemic conditions, hemoglobinopathies and racial differences.

Up until this moment, ferritin is considered as one of the best markers to assess the body iron stores[13], being recommended by the WHO[28] as a complement in the use of hemoglobin for the diagnosis of anemia or as a parameter to diagnose the depletion of iron stores, as performed in this study, However, since ferritin is an acute-phase response protein, its interpretation as normal may be false (when there is presence of inflammation and infection, when its concentrations increase).

The variables literacy, possession of assets and regime of occupation in the household reflect the socioeconomic conditions of the population studied, and presented a borderline association with the prevalence of anemia. The women who had few assets and lived in granted households had approximately twice as many chances of developing anemia.

Brazilian studies referring to the investigation of determining factors for iron-deficiency anemia among women at reproductive age reveal that low socioeconomic conditions[6,7] are favorable for the worsened prevalence of the condition. According to Silva et al.[9], among the risk factors that presented significance for the development of anemia in the assessed women, the type of occupation in the household, lack of waste collection, and lack of prenatal care reflect the unfavorable socioeconomic conditions of this population, corroborating the findings in this study. An analysis carried out with indigenous women from Suruí (from the Indigenous Location Sete de Setembro, located between the States of Rondônia and Mato Grosso) corroborates this study, since the levels of hemoglobin presented linear reduction with the reduced socioeconomic status, thus increasing the prevalence of anemia in this group[8]. Shamah-Levy et al.[29] also found significance in the variable socioeconomic condition after the multivariate adjustment with anemia in Mexican women.

Even though the occurrence of anemia still presents a dependent relationship with income, schooling, low household conditions and other negative socioeconomic situations, it is distributed in all social groups and geo-economic blocks[1]. The prevalence of anemia found in this study for the groups of women who presented dietary safety in their households (17.5%) is similar to the prevalence of those who lived with dietary insecurity (20%), even though this category includes all levels of insecurity, from mild to severe, therefore with a tendency to not discriminate differences, and being similar to the group that does not present dietary insecurity. The study by Silva et al.[18] ratifies that anemia is present in all social groups, which may be justified by the probable occurrence of inadequate diet and diets with low iron bioavailability.

The results of this study show the relevant prevalence of anemia, characterized as a public health issue, and a consistent association between this condition and biological factors such as age and ferritin values. Borderline associations were also shown between anemia in women at reproductive age in the city of Vitória de Santo Antão and the variables analyzed: possession of assets, regime of occupation in the household, presence of children aged less than five years in the family and women's age.

As a limitation of this study, it is not possible to infer causality relations since it is a cross-sectional analysis, in which the outcome and the associated factors are analyzed simultaneously, at a punctual moment, making it difficult to determine cause and effect relationships, which may lead to reverse causality bias. Besides, the use of self-reported data may present information bias; however, studies such as the ones conducted by the Telephone Surveillance of Risk and Protective Factors for Chronic Diseases (Vigitel) confirm the validity of the data acquired from this perspective[30].

CONCLUSION

The prevalence of anemia in the group of women analyzed followed the global tendency of developing countries, justifying the adoption of efficient preventive and early intervention measurements, besides the definition of policies and the construction of programmatic actions, properly based on real data, on a local and/or regional level.

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Received on: 06/08/2015
Final version presented on: 12/27/2016
Accepted on: 02/23/2017