Anemia in Mexican women: Results of two national probabilistic surveys

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Abstract

Objective. To describe the prevalence of anemia in Mexican women and analyze its trends with information from the last two national nutrition surveys. Material and methods. The prevalence of anemia in women was analyzed. Anemia was adjusted by socioeconomic profile and by potentially explanatory variables. Results. The overall prevalence of anemia for pregnant women was 20.2% (95% CI 15.9, 26.2%) and 15.5% for non-pregnant women (95% CI 14.7, 16.4%). The prevalence of anemia in women decreased from 1999 to 2006 in all socioeconomic profiles. Adolescent women living in the northern and in the southern regions had a greater risk of anemia than those in Mexico City (p = 0.05). Significant risk was found among low socioeconomic level (p < 0.06). Greater parity was a significant risk factor (p < 0.05) for being anemic. Conclusions. Although anemia in reproductive age women in Mexico decreased, it continues to be a public health problem.

Keywords: anemia; women; surveys; prevalence; Mexico

Resumen

Objetivo. Describir la prevalencia de anemia en mujeres y analizar su tendencia a través de las dos últimas encuestas nacionales de nutrición. Material y métodos. Se analizó la prevalencia de anemia en mujeres. La prevalencia de anemia se ajustó por perfil socioeconómico y por posibles variables que la expliquen. Resultados. La prevalencia global de anemia fue de 20.2% (IC95% 15.9, 26.2%) para mujeres embarazadas y de 15.5% (IC95% 14.7, 16.4%) para mujeres no embarazadas. La prevalencia de anemia en mujeres disminuyó de 1999 a 2006 en todos los niveles socioeconómicos. Las mujeres adolescentes que viven en las regiones norte y sur tuvieron mayor riesgo de anemia que las que viven en la Ciudad de México (p = 0.05). Se encontró un riesgo significativo asociado con el nivel socioeconómico bajo (p < 0.06). La mayor paridad resultó ser un factor de riesgo significativo (p < 0.05). Conclusiones. Aun cuando la presencia de anemia en mujeres en edad reproductiva en México ha disminuido, continúa siendo un problema de salud pública.

Palabras clave: anemia; mujeres; encuestas; prevalencia; México

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Anemia is a public health problem affecting millions of people; it has far-reaching consequences for human health and social and economic development. The World Health Organization (WHO, 2001) estimated that a total of 2,000 million people worldwide were anemic, half of those being cases associated with iron deficiency. Severe anemia in women is associated with a higher risk of perinatal morbidity and mortality; it is also associated with impaired cognitive and physical development in children as well as with low work productivity in adults.

It has been estimated that the risk to develop anemia is 2 to 7 times greater in developing countries than in industrialized ones, particularly in rural areas. Prevalence of anemia may be as high as 35% in women of reproductive age and 50% in pregnant women living in economically depressed regions.

Casanueva et al. reviewed 46 epidemiological and clinical studies published between 1939 and 2005, as well as Mexico-based governmental intervention programs. They found that the estimated prevalence of anemia in non-pregnant women of reproductive age has decreased from 39.6 to 15.5% (24.1 percentage points) in the last 65 years, whereas in pregnant women it has only decreased 10 pp. Therefore, anemia in Mexican pregnant women is a more critical public health problem.

The two most recent probabilistic national nutrition and health surveys reported a prevalence of 15.4% and 20.8% in non-pregnant and 18.2% and 26.7% in pregnant women.

The objective of this investigation is to describe the prevalence and distribution of anemia in women 12 to 49 years of age in the latest Mexican National Nutrition and Health Survey 2006 (ENSANUT 2006) and to compare the changes related to the previous survey carried out in 1999 (ENN 99). Such analyses are intended to provide relevant information for developing appropriate national policies aimed at reducing and controlling the prevalence of anemia in Mexican women, as it is one of the most important national nutritional problems.

**Material and methods**

**Population**

Samples of women of reproductive age (12 to 49 years old) from two national nutrition surveys were collected. The ENN 99 with a sample size of 17,194 subjects and the ENSANUT 2006, with a sample size of 21,135 women.

**Surveys’ design**

Both surveys were designed to be representative at the national level, in rural and urban areas, and in four geographic regions defined as: northern, central, Mexico City (including its metropolitan municipalities) and the southern region. The design of the surveys was stratified and by conglomerates. Further details about the methodology used for these two surveys have been described previously. The methodological design, operative definitions and instruments used were purposely maintained as equal as possible for both surveys, allowing for fair comparisons among them.

**Data Collection**

**Anemia**

The hemoglobin concentrations in ENN 99 and ENSANUT 2006 were measured in capillary blood using a portable photometer Hemocue (Hemocue Inc., Angelholm, Sweden). Anemia was defined as the concentration of hemoglobin below 12.0 g/dL at sea level for non-pregnant women and below 11.0 g/dL for pregnant women, in accordance with WHO recommendations. Hemoglobin concentrations were adjusted for altitude using the equation published by Cohen and Hass. Hemoglobin values under 5.0 g/dL and above 18.5 g/dL were considered spurious and excluded from the analysis according to criteria published previously.

**Socioeconomic characteristics**

Information on socioeconomic characteristics in both Surveys was based on housing characteristics (flooring material, sewage system, water piping) and family assets (ownership of a car, refrigerator, radio, television and telephone and being beneficiary of a food distribution program). Parity was stratified into three categories: women with less than three children, with three to five children, and with more than five children.

**Anthropometry**

Weight and height were measured using standard anthropometric methodology. Weight was measured using an electronic scale with 10g of precision (Tanita, model 1583, Tokyo, Japan). Height was measured using an anthropometer with a maximum capacity of 2m and
Prevalence of anemia in Mexican women

Results

The overall prevalence of anemia in ENSANUT 2006 for pregnant women was 20.2% (95% CI 15.9, 26.2%) and 15.5% for non-pregnant women (95% CI; 14.7, 16.4%). A reduction of 4.9 pp in the prevalence of anemia in non-pregnant women and of 4.5 pp in pregnant women from 1999 to 2006 was observed.

The prevalence of anemia for each survey in non-pregnant women is shown in Table I. In both surveys (ENN 99, and ENSANUT 2006), the prevalence of anemia increased with age and it was higher in pregnant than in non-pregnant women. The prevalence of anemia was 12 pp higher in women with a larger parity (>5 children) than those with parity 0 (Table I). The prevalence of anemia increased as BMI increased in ENSANUT 2006 but not in ENN 99. Women living in the northern and southern regions and of indigenous ethnicity were the most affected by anemia in both surveys; reductions of about 5 pp were observed in these categories from 1999 to 2006.

Table II shows the mean concentrations of hemoglobin (g/dL) of women studied in both nutrition surveys, categorized by pregnant or non-pregnant status, geographical region and urban or rural dwelling. The hemoglobin concentration of non-pregnant women was more than 1 g/dL higher than that of pregnant women but no significant differences were observed between the overall and category-specific means of hemoglobin in 1999 and 2006.

Figure 1 shows the overall prevalence of anemia in non-pregnant women adjusted by socioeconomic profile for each survey. Although the prevalence of anemia was not different among surveys it tended to be lower in 2006 than in 1999 in the medium and low socioeconomic profiles. Comparisons within surveys showed a lower prevalence in the higher socioeconomic profile compared to the low in 1999. Such a difference vanished in 2006.

The prevalence of anemia by region adjusted by socioeconomic profile according to the year of the survey is presented in figure 2. In 2006, there was a reduction in the prevalence of anemia in all three profiles; however, it was not statistically significant.

Adjusted OR for adolescent women living in the northern and southern regions was higher than that of those living in Mexico City (p=0.05). Another risk factor was belonging to low socioeconomic level (p=0.06). For adult women, parity greater than three was a significant risk (p=0.05). Having indigenous ethnicity or being
beneficiary of food distribution programs was not associated with anemia (Table III).

**Discussion**

Anemia in women of reproductive age continues to be a public health problem in Mexico, although of medium importance according to the WHO grading of the prevalence of anemia in non-pregnant (medium= 5 - 19.9%) and pregnant women (>20).21 In this period (1999-2006), there was a 5.6 pp decrease for non-pregnant and 4.5 pp for pregnant women. If the changes between 1999 and 2006 continue at the same pace, 8.4 and 9.6 years would be needed to reduce the prevalence of anemia of non-pregnant and pregnant women, respectively, to acceptable rates (<5.0%).22

When adjusting the information from both surveys according to socioeconomic profile, we found that the southern region shows a severe anemia prevalence regardless of the period observed. This fact must be kept in sight since this region concentrates a high proportion of indigenous population with the least economic

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**Table I**

**Prevalence (%) of anemia* in 12 to 49 year-old non-pregnant women according to different characteristics. Mexico, ENN 1999; ENSANUT 2006**

<table>
<thead>
<tr>
<th></th>
<th>ENN 99</th>
<th></th>
<th></th>
<th>ENN 99</th>
<th></th>
<th></th>
<th>ENSANUT 2006</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sample</td>
<td>N (Thousands)</td>
<td>%</td>
<td>CI95%</td>
<td>Sample</td>
<td>N (Thousands)</td>
<td>%</td>
<td>CI95%</td>
</tr>
<tr>
<td><strong>Age (y)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 to 18</td>
<td>4 314</td>
<td>4 929.2</td>
<td>16.9</td>
<td>(15.5, 18.4)</td>
<td>6 388</td>
<td>951.4</td>
<td>11.5</td>
<td>(10.4, 12.8)</td>
</tr>
<tr>
<td>19 to 35</td>
<td>8 786</td>
<td>9 352.5</td>
<td>21.3</td>
<td>(20.1, 22.5)</td>
<td>8 181</td>
<td>2 348.8</td>
<td>16.7</td>
<td>(15.3, 18.2)</td>
</tr>
<tr>
<td>36 to 49</td>
<td>4 390</td>
<td>5 244.3</td>
<td>23.6</td>
<td>(22.1, 25.2)</td>
<td>6 041</td>
<td>2 075.8</td>
<td>19.5</td>
<td>(17.8, 21.3)</td>
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<td><strong>Parity (Num. children)</strong></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>6 378</td>
<td>7 606.5</td>
<td>16.3</td>
<td>(15.1, 17.5)</td>
<td>9 423</td>
<td>1 812.3</td>
<td>12.5</td>
<td>(11.4, 13.7)</td>
</tr>
<tr>
<td>1 to 2</td>
<td>4 291</td>
<td>5 315.5</td>
<td>22.7</td>
<td>(21.1, 24.3)</td>
<td>4 219</td>
<td>1 376.8</td>
<td>17.5</td>
<td>(15.3, 19.6)</td>
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<tr>
<td>3 to 5</td>
<td>4 373</td>
<td>5 044.5</td>
<td>23.3</td>
<td>(21.7, 25.0)</td>
<td>5 701</td>
<td>1 783.3</td>
<td>20.3</td>
<td>(18.7, 22.1)</td>
</tr>
<tr>
<td>&gt; 5</td>
<td>1 449</td>
<td>1 559.5</td>
<td>28.2</td>
<td>(25.5, 31.1)</td>
<td>1 267</td>
<td>403.6</td>
<td>22.2</td>
<td>(19.0, 25.8)</td>
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<tr>
<td><strong>BMI (body/height2)</strong></td>
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<tr>
<td>&lt;18</td>
<td>238</td>
<td>178.9</td>
<td>18.8</td>
<td>(13.4, 25.9)</td>
<td>877</td>
<td>109.4</td>
<td>8.8</td>
<td>(6.7, 11.4)</td>
</tr>
<tr>
<td>18.0 to 24.9</td>
<td>6 451</td>
<td>6 153.9</td>
<td>22.3</td>
<td>(20.9, 23.8)</td>
<td>8 231</td>
<td>1 906.9</td>
<td>14.8</td>
<td>(13.6, 16.1)</td>
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<tr>
<td>25 to 29.9</td>
<td>4 158</td>
<td>5 811.5</td>
<td>18.7</td>
<td>(17.3, 20.3)</td>
<td>6 266</td>
<td>1 860.1</td>
<td>18.0</td>
<td>(16.3, 19.9)</td>
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<tr>
<td>&gt;=30</td>
<td>3 041</td>
<td>4 579.9</td>
<td>20.6</td>
<td>(19.0, 22.2)</td>
<td>5 133</td>
<td>1 465.4</td>
<td>17.5</td>
<td>(15.8, 19.3)</td>
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<tr>
<td><strong>Area</strong></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>10 282</td>
<td>14 369.3</td>
<td>20.2</td>
<td>(19.1, 21.2)</td>
<td>14 500</td>
<td>4 140.6</td>
<td>16.2</td>
<td>(15.2, 17.3)</td>
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<tr>
<td>Rural</td>
<td>6 209</td>
<td>5 156.7</td>
<td>22.6</td>
<td>(21.0, 24.2)</td>
<td>6 110</td>
<td>1 235.4</td>
<td>16.6</td>
<td>(15.2, 18.2)</td>
</tr>
<tr>
<td><strong>Region</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northern</td>
<td>5 059</td>
<td>3 838.2</td>
<td>20.9</td>
<td>(19.2, 22.7)</td>
<td>4 309</td>
<td>1 055.6</td>
<td>16.7</td>
<td>(15.1, 18.4)</td>
</tr>
<tr>
<td>Center</td>
<td>4 644</td>
<td>6 013.5</td>
<td>20.6</td>
<td>(19.1, 22.2)</td>
<td>7 813</td>
<td>1 700.9</td>
<td>16.5</td>
<td>(15.1, 18.1)</td>
</tr>
<tr>
<td>Mexico City</td>
<td>1 539</td>
<td>3 186.0</td>
<td>16.4</td>
<td>(14.1, 18.9)</td>
<td>835</td>
<td>820.9</td>
<td>13.6</td>
<td>(10.9, 16.8)</td>
</tr>
<tr>
<td>Southern</td>
<td>5 249</td>
<td>6 488.3</td>
<td>23.1</td>
<td>(21.6, 24.7)</td>
<td>7 653</td>
<td>1 798.4</td>
<td>17.4</td>
<td>(16.1, 18.7)</td>
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<tr>
<td><strong>Indigenous</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non indigenous</td>
<td>15 010</td>
<td>17 831.1</td>
<td>20.4</td>
<td>(19.5, 21.3)</td>
<td>19 066</td>
<td>4 994.6</td>
<td>16.2</td>
<td>(15.3, 17.2)</td>
</tr>
<tr>
<td>Indigenous</td>
<td>1 480</td>
<td>1 694.9</td>
<td>24.8</td>
<td>(22.2, 27.5)</td>
<td>1 536</td>
<td>381.4</td>
<td>17.6</td>
<td>(15.1, 20.3)</td>
</tr>
</tbody>
</table>

* Pregnant women <11 g/dL. Non-pregnant women <12 g/dL (sea level)
Table II

MEAN AND 95% CONFIDENCE INTERVAL OF HEMOGLOBIN (g/dL) IN WOMEN 12 TO 49 YEARS OLD ACCORDING TO PHYSIOLOGICAL CONDITION BY REGION AND NATIONALLY. MEXICO, ENN 1999; ENSANUT 2006

<table>
<thead>
<tr>
<th>Region</th>
<th>Sample Number (Thousands)</th>
<th>ENN 99 Number Mean (Thousands)</th>
<th>ENN 99 CI95%</th>
<th>ENSANUT 06 Number Mean (Thousands)</th>
<th>ENSANUT 06 CI95%</th>
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<td>Pregnant</td>
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<tr>
<td>Northern</td>
<td>207</td>
<td>157.2</td>
<td>11.9</td>
<td>11.6 a 12.1</td>
<td>114</td>
</tr>
<tr>
<td>Center</td>
<td>210</td>
<td>277.4</td>
<td>12.4</td>
<td>12.2 a 12.7</td>
<td>199</td>
</tr>
<tr>
<td>Mexico City</td>
<td>58</td>
<td>134.8</td>
<td>12.6</td>
<td>12.1 a 13.1</td>
<td>19</td>
</tr>
<tr>
<td>Southern</td>
<td>219</td>
<td>271.2</td>
<td>12.0</td>
<td>11.8 a 12.2</td>
<td>193</td>
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<tr>
<td>Rural</td>
<td>300</td>
<td>253.3</td>
<td>12.2</td>
<td>12.0 a 12.4</td>
<td>166</td>
</tr>
<tr>
<td>Urban</td>
<td>394</td>
<td>587.3</td>
<td>12.2</td>
<td>12.0 a 12.4</td>
<td>359</td>
</tr>
<tr>
<td>National</td>
<td>694</td>
<td>840.6</td>
<td>12.2</td>
<td>12.1 a 12.3</td>
<td>525</td>
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</table>

Non-pregnant

<table>
<thead>
<tr>
<th>Region</th>
<th>Sample Number (Thousands)</th>
<th>ENN 99 Number Mean (Thousands)</th>
<th>ENN 99 CI95%</th>
<th>ENSANUT 06 Number Mean (Thousands)</th>
<th>ENSANUT 06 CI95%</th>
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<tbody>
<tr>
<td>Northern</td>
<td>5050</td>
<td>3819.6</td>
<td>13.1</td>
<td>13.0 a 13.1</td>
<td>4307</td>
</tr>
<tr>
<td>Center</td>
<td>4635</td>
<td>6048.3</td>
<td>13.6</td>
<td>15.5 a 13.6</td>
<td>7793</td>
</tr>
<tr>
<td>Mexico City</td>
<td>1535</td>
<td>3160.8</td>
<td>14.0</td>
<td>13.9 a 14.1</td>
<td>825</td>
</tr>
<tr>
<td>Southern</td>
<td>5234</td>
<td>6497.9</td>
<td>13.2</td>
<td>13.1 a 13.2</td>
<td>7641</td>
</tr>
<tr>
<td>Rural</td>
<td>6202</td>
<td>5155.9</td>
<td>13.3</td>
<td>13.2 a 13.3</td>
<td>6090</td>
</tr>
<tr>
<td>Urban</td>
<td>10252</td>
<td>14370.8</td>
<td>13.4</td>
<td>13.4 a 13.5</td>
<td>14469</td>
</tr>
<tr>
<td>National</td>
<td>16454</td>
<td>19526.7</td>
<td>13.4</td>
<td>13.37 a 13.4</td>
<td>20566</td>
</tr>
</tbody>
</table>

opportunities and the worst life standards. Also to be noticed are the consistently high prevalences of anemia in women in the northern region where the population with the highest socioeconomic profile concentrates (Figure 2). This can be a result of such variables as age, sex, kind of diet, frequency and intensity of acute recurrent infections, the existence of chronic inflammatory processes or other nutritional deficiencies such as folate or vitamin A or B12. Similar prevalences can be found among women in small towns in the northern region as is the case in the Tarahumara area where anemia prevalence was 16.1% (mean of hemoglobin concentration 140±16 g/l) and 25.7% (129±12 g/l) for non-pregnant and pregnant women, respectively.

It has been documented that demographic indicators such as age, number of children, parity and education were associated with iron deficiency or anemia and there was an association between education and increasing meat intake. This suggests better-educated women can afford, or make it a priority to include meat in their diet. It is also possible to suppose that factors other than socioeconomic profile contribute importantly to the presence of anemia (Figure 1). These results suggest that priority should be given to cure anemia in pregnant women since 1 out of 5 women suffer from it, not only because of its deleteri-
ous effects on the maternal body but also because of the grave repercussions for their neonates.29-30

In several countries worldwide, various iron supplementation programs have been enacted to reduce anemia in pregnant and breastfeeding women. However, most of these programs have not been successful due in many instances to late intervention during pregnancy.31,32 In addition, one of the main problems is low compliance with iron supplementation.33,34 In the case of small children, an age when iron deficiency anemia is also highly prevalent, few countries have large scale programs to reduce and control anemia. As a result of the latter two situations an unchanged worldwide prevalence of anemia has been maintained for the past 15 years.35

An important proportion of the cases with anemia is not exclusively due to iron deficiency; deficiencies of other hemopoietic micronutrients such as folate, vitamin B12 and vitamin A are associated with anemia. If the actual goal of public health programs is to control anemia, then the problem can not be tackled simply aiming to reduce iron deficiency. In a randomized controlled study carried out in rural Nepal; women were treated with either: a) folic acid, b) folic acid with iron, c) folic acid with iron, zinc and other 11 micronutrients or vitamin A. Women receiving folic acid and iron had the highest hemoglobin concentration at the end of the trial.36

The association of higher prevalence of anemia with parity suggests a progressive depletion of iron stores during successive pregnancies without an adequate recovery, thus multiparous women had a greater risk for anemia than primiparous women.37,38

It has been documented that iron deficiency anemia is a serious public health problem, especially for women and small children, causing negative consequences on human capital for a country. Based on that evidence, goals to fight anemia have been established at international, national and local levels. Such strategies include actions aimed to increase, for the whole population, the supply, access and intake of quality foods, along with programs to supplement and fortify food with iron.39

Consistent and updated information have been produced in Mexico to quantify the prevalence and distribution of anemia in women of reproductive age. Nearly three-fourths of the research published are of descriptive nature; more recently, a handful of clinical trials
have evaluated the efficacy and effectiveness of public nutrition programs, demonstrating variable success of the interventions. However, the reduction of 0.7 pp in the prevalence of anemia from 1999 to 2006 suggests a positive impact of massive nutritional supplementation programs directed to highly vulnerable populations living in extreme poverty. This is the case of Oportunidades which provides 21.2% of pregnant women with anemia with a fortified beverage (ENSANUT 2006) and Arriñque Parejo en la Vida which distributes a multi-mineral and vitamin supplement; their impact, however, has not yet been documented.

In Mexico, economic indicators have not changed with respect to the percentage of people who live in nutritional poverty, according to GINI’s index of indicators of nutrition status. Also, the use of the contraceptive methods for the prevention of the pregnancy does not show variation over the past decades, specifically in the use of intrauterine devices (≈ 20%) that could generate bleeding in women. Regardless of the progress achieved in reducing anemia in women of reproductive age, the problem is far from being resolved. Process evaluation research of programs is needed to improve their effectiveness. Moreover, it is necessary to study and evaluate new strategies for the supplementation and fortification of food with micronutrients to fight anemia in women. Targeted screening and interventions to improve and strengthen effectiveness of interventions such as diet and compliance with iron supplementation are warranted for this at-risk group and developing stronger political commitments on the part of national and international agencies to enhance coverage of effective interventions is urged. Furthermore, it is essential to consider a strong educational strategy among the population that receives food and benefits from nutrition programs.

Table III

<table>
<thead>
<tr>
<th>Parity</th>
<th>OR (CI 95%)</th>
<th>OR (CI 95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;3 children</td>
<td>-</td>
<td>1.3 [0.9 to 1.6]</td>
</tr>
<tr>
<td>3 to 5 children</td>
<td>-</td>
<td>1.5 [1.2 to 1.9]</td>
</tr>
<tr>
<td>&gt; 5 children</td>
<td>-</td>
<td>1.6 [1.2 to 2.2]</td>
</tr>
</tbody>
</table>

BMI (kg/m²)

Age at menarche

Height

Socioeconomic level

Low

Medium

Region

Northern

Center

Southern

Urban

Indigenous

Beneficiary programs

Oportunidades

Licora

Other Food Programs

OR

0.9 [0.7 to 1.0]

0.7 [0.5 to 1.2]

0.7 [0.5 to 1.2]

0.9 [0.7 to 1.0]

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0.9 [0.7 to 1.0]

Table III

Logistic regression model for anemia,§ considering complex sampling variance among adolescent and adult non-pregnant women in a national probabilistic sample. Mexico, ENN 1999; ENSANUT 2006

<table>
<thead>
<tr>
<th>Socioeconomic level</th>
<th>Adolescent women</th>
<th>Adult women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1.4 †</td>
<td>1.1 to 1.9</td>
</tr>
<tr>
<td>Medium</td>
<td>1.2</td>
<td>0.9 to 1.6</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northern</td>
<td>1.3‡</td>
<td>1.1 to 1.8</td>
</tr>
<tr>
<td>Center</td>
<td>1.0</td>
<td>0.6 to 1.7</td>
</tr>
<tr>
<td>Southern</td>
<td>1.7§</td>
<td>1.3 to 2.3</td>
</tr>
<tr>
<td>Urban</td>
<td>1.2</td>
<td>0.9 to 1.5</td>
</tr>
<tr>
<td>Indigenous</td>
<td>0.7</td>
<td>0.5 to 1.2</td>
</tr>
</tbody>
</table>

Beneficiary programs

<table>
<thead>
<tr>
<th></th>
<th>OR (CI 95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oportunidades</td>
<td>0.9 [0.7 to 1.0]</td>
</tr>
<tr>
<td>Licorna</td>
<td>0.5 [0.2 to 1.5]</td>
</tr>
<tr>
<td>Other Food Programs</td>
<td>1.2 [0.9 to 1.6]</td>
</tr>
</tbody>
</table>

§ p < 0.05
† p = 0.06
‡ < 12 g/dL (sea level)

References


* CONEVAL. http://www.coneval.gob.mx.


