



Micronutrient deficiencies in the English-speaking Caribbean and in Guyana

Several recent publications have provided new details on the status of micronutrient deficiencies in the Americas. For example, the 1998 edition of the PAHO quadrennial report on health in the Region indicated that while iodine fortification of salt and vitamin-A fortification of other foods has considerably reduced problems with those deficiencies in the Americas, iron deficiency anemia remains much more widespread (1).

Another recent PAHO report, dealing with health conditions in the Caribbean, pointed to several major changes in food and nutrition patterns in that area over the last 25 years. The food available for consumption in the Caribbean has improved substantially, dependence on imported food has increased, and the traditional diet has been largely replaced by one more like that of developed countries. Undernutrition has declined, and obesity has become common. The overall improvement in nutrition, along with food fortification programs, has reduced the occurrence of micronutrient deficiencies (2).

Three recent studies add further to the knowledge of the micronutrient status of the English-speaking countries of the Caribbean and of Guyana. All three studies were carried out by or in collaboration with the Caribbean Food and Nutrition Institute (CFNI). Located at the University of the West Indies, in Kingston, Jamaica, CFNI is one of two specialized PAHO centers that work to improve the food and nutrition situation in the Americas.

The three new studies all looked at deficiencies in vitamin A and iron. And while deficiencies in those micronutrients have been investigated before in the Caribbean, the new studies added a new level of detail. To better understand vitamin A deficiencies, the investigators simultaneously assessed both serum retinol and β -carotene levels. Similarly, iron deficiencies were studied using not just the usual index of hemoglobin (circulating iron), but also serum ferritin (iron stores).

These three studies are also believed to be the first investigations of vitamin E levels in the area. Researching vitamin E deficiencies in the English-speaking Caribbean and Guyana could produce important long-term health benefits, given the evidence that vitamin E and other antioxidants may help prevent cancer and cardiovascular disease, which are becoming increasingly important as causes of death in the area.

The three studies focused on three key target groups: young children, school-age children, and pregnant women. Blood samples were taken from the study participants for laboratory assessment of micronutrient deficiencies, and a survey questionnaire was used to gather information on food consumption patterns.

The three investigations produced similar results. The most common deficiency was iron. While severe vitamin A deficiencies were rare, marginal deficiencies were more common.

Many of the researchers' recommendations were similar for the various countries in the three studies. To deal with the high level of marginal vitamin A deficiency, governments and international agencies need to continue promoting the availability and consumption of foods rich in vitamin A and carotene. Programs dealing with anemia particularly need to target children 1–4 and pregnant women.

Jamaica¹

As with the two other reports, the primary aim of the Jamaica study was to look at magnitude, severity, and distribution of deficiencies in vitamin A, β -carotene, and iron, especially among children and women. The overall goal was to generate information that would increase the awareness of micronutrient deficiencies and guide strategies and interventions to reduce them.

A population survey was used, with a representative sample from three target groups selected from all of Jamaica's 14 parishes. The target groups were children 1–4 years of age, schoolchildren between age 5 and 16, and pregnant women.

The pregnant women surveyed were located through a sample of 29 of the country's 335 local health centers; a total of 361 women participated in the study. The younger children were also selected from the same group of 29 health centers; samples were collected from 309 of the children. For the older children, students were surveyed at 25 of the country's 802 primary or all-age schools and 15 of the 136 secondary or high schools. In total, 417 school-age children were surveyed.

A blood sample was taken from each of the study participants and used to assess levels of serum ferritin, retinol, β -carotene, vitamin E, and hemoglobin. The researchers also used a short questionnaire to gather information on consump-

tion of foods rich in the micronutrients being studied. Parents or guardians gave responses for the young children. All the children were also weighed and measured for anthropometric assessment.

The prevalence of severe vitamin A deficiency (serum retinol ≤ 10 $\mu\text{g}/\text{dL}$) was very low, under 1.0% for all three groups studied. However, the prevalence of marginal deficiency (10–24.9 $\mu\text{g}/\text{dL}$) was 58.1% for young children. Marginal-deficiency levels for older children and pregnant women were 18.8% and 33.6%, respectively. Levels of β -carotene were below normal (< 2 $\mu\text{g}/\text{dL}$) for only one group, the children 1–4, and just for 1.2% of them.

Iron levels were assessed using two measures, hemoglobin (deficiency < 11 g/dL for children under 6 and for pregnant women, < 12 g/dL for others) and serum ferritin (deficiency < 12 $\mu\text{g}/\text{L}$ for all the groups). Among children 1–4 years old, 30.3% showed anemia on both those measures. For children 5–16, iron deficiency on the two measures was lower, 10.7%. Of the pregnant women, 38.7% showed deficiencies on the two measures.

Vitamin E deficiency (< 500 $\mu\text{g}/\text{dL}$) was 50.4% among children 1–4, 17.0% among children 5–16, and 9.6% among pregnant women.

The anthropometric assessment found low levels of undernutrition. For children 1–4, measures of stunting, wasting, and underweight ranged from 5.2% to 9.9%. Body mass index measures among children aged 10–16 showed 16.5% were underweight and 15.1% were overweight.

Citrus fruits and dairy foods were frequently consumed, the results from the survey questionnaire indicated. The survey also tried to determine if vitamin C-rich foods that would promote iron absorption were eaten with such iron-rich foods as liver and callaloo, a spinach-like vegetable. Of those surveyed, 60.4% did not eat a citrus fruit or drink with an iron-rich meal. The survey also found that only 38.5% of the pregnant women took daily iron supplements.

Based on these results, the researchers made a number of recommendations. Even though severe vitamin A deficiency was rare, the high level of marginal deficiency indicates that the Government of Jamaica and international development agencies should continue their existing efforts to promote the availability and consumption of foods rich in vitamin A and carotene.

Programs should also address the high level of iron deficiency anemia, especially among children 1–4 and pregnant women. Appropriate measures could include dietary diversification, food fortification, iron supplementation, and the promotion of breast-feeding. Social marketing efforts could also encourage the proper consumption of

¹ Based on: Caribbean Food and Nutrition Institute. Micronutrient study report—Jamaica: an assessment of the vitamin A, beta-carotene, and iron status in Jamaica. Kingston, Jamaica: CFNI; 1998.

iron, such as having citrus fruit or juice with an iron-rich meal.

Given the level of undernutrition among older children, consideration should be given to a supplementary feeding program for children 10–16. To reduce obesity in adulthood, programs and policies should promote healthy eating habits among children.

Antigua and Barbuda, Dominica, and Saint Vincent and the Grenadines²

A study on the three nations of Antigua and Barbuda, Dominica, and Saint Vincent and the Grenadines was very similar to the Jamaican one, both in terms of goals and methodology as well as the results. In addition, many of the recommendations from the three-country study closely resembled the ones for Jamaica.

One difference in the three-country study was that schoolchildren up to the age of 19 were included. While also using a survey questionnaire to gather information about food consumption, the three-country survey did not examine whether persons consumed iron-absorption enhancers, such as citrus fruits or drinks, with iron-rich foods.

In the three countries, surveyed children aged 1–4 came from child health clinics, schoolchildren aged 5–19 were selected from primary and secondary schools, and pregnant women came from antenatal clinics. Blood samples were analyzed for serum ferritin, hemoglobin, retinol, β -carotene, and vitamin E.

As with Jamaica, the three-country study found that iron anemia was the most common micronutrient deficiency. In Dominica, for example, low hemoglobin levels (<11 g/dL for children under 6 and for pregnant women, <12 g/dL for others) were found in 34.4% of the children aged 1–4, in 30.7% of the older children, and in 35.6% of the pregnant women.

Vitamin A deficiency (serum retinol <10 μ g/dL) was extremely rare in the three countries; the highest prevalence found was 1.3% for children 1–4 in Dominica. Marginal vitamin A deficiency (serum retinol 10–25 μ g/dL), however, was more common, particularly among younger children. Vitamin E levels were in the normal range except for elevated levels in young children in Antigua and in Saint Vincent and the Grenadines.

Because of the low levels of vitamin A deficiency, the researchers concluded no special measures were warranted, suggesting instead that the three countries continue their successful policies of increasing the availability and consumption of foods rich in vitamin A and carotene.

Iron deficiencies could be reduced through short-, medium-, and long-term measures. Possible steps include intensive dietary education programs to encourage people to consume citrus fruits and other absorption-enhancing foods along with iron-rich foods and to discourage combining iron-rich foods and such inhibiting foods as tea, coffee, and cow's milk. Exclusive breast-feeding during the first 4–6 months should also be advocated.

In the medium term, health ministries should work to see that pregnant women receive iron supplements before they develop deficiencies. Food fortification could be effective in the medium and long term, but it should target specific high-risk groups, such as by fortifying cornmeal, which is consumed largely by young children.

Guyana³

The Guyana study also had as its purpose the collecting of data on micronutrient and nutritional deficiencies and using that information for planning and interventions. A nationwide household survey covered four target groups: children up to 4 years old, schoolchildren aged 5–14, adults 15–60, and pregnant women. The Guyana investigation assessed deficiencies in vitamin A, β -carotene, iron, and also iodine.

No serious vitamin A deficiencies were found in any of the target groups. Marginal deficiencies (serum retinol 10–25 μ g/dL) were found in 10.6% of the younger children, 2.9% of the older children, and 3.2% of the pregnant women. The status of iodine was similar, with very little severe deficiency but moderate deficiency found in 6.4% of children aged 5–14 and in 16.5% of the pregnant women.

Iron deficiency, however, was a major problem. Over 40% of all four of the target groups showed deficiencies in hemoglobin. Other nutritional concerns identified in the study included undernutrition in children and obesity among adults.

Among the recommended interventions were encouraging changes in eating patterns, such as

² Based on: Caribbean Food and Nutrition Institute. Micronutrient study report—a three country survey: vitamin A, E, beta-carotene and iron status in the Caribbean. Kingston, Jamaica: CFNI; 1997.

³ Based on: Caribbean Food and Nutrition Institute. Micronutrient study report—Guyana: an assessment of the vitamin A, beta-carotene, iron and iodine status in the population. Kingston, Jamaica: CFNI; 1997.

promoting the consumption of citrus fruit when eating iron-rich foods. In addition, pregnant women should be targeted with a preventive and therapeutic iron supplementary program.

More could be done through food fortification programs. Currently in Guyana, flour is fortified with iron and imported milk is fortified with iron and vitamin A. Monitoring programs should regularly check the level of fortificants. Also needed is a detailed assessment of consumption patterns of fortified foods and known inhibitors and enhancers.

To deal with the iodine deficiencies, salt importers should be monitored to ensure they are purchasing iodized salt for consumption in Guyana. And since iodine can be lost between importation and consumption, iodine levels should be monitored at the wholesale, retail, and community levels.

Given the undernutrition found in children, consideration should be given to a supplementary feeding program. Steps to deal with adult obesity might include sponsoring and promoting exercise programs targeting adults and teaching children healthy eating habits that they will practice throughout the rest of their lives.

SINOPSIS

Deficiencias de micronutrientes en el Caribe de habla inglesa y en Guyana

Tres estudios recientes analizaron el grado de deficiencia de vitamina A, betacarotenos y hierro en Jamaica, Antigua y Barbuda, Dominica, San Vicente y las Granadinas y Guyana. Todos los estudios fueron efectuados por el Instituto Caribeño de Alimentación y Nutrición, o en colaboración con él.

En todas las encuestas, que fueron similares en su estructura y resultados, se recolectaron muestras de sangre con el fin de determinar las deficiencias de micronutrientes. También se aplicaron cuestionarios para recoger información sobre los patrones de alimentación. Los principales grupos estudiados fueron los niños pequeños, los escolares y las mujeres embarazadas.

La anemia por deficiencia de hierro fue la deficiencia de micronutrientes más común de las que se encontraron en los tres estudios. Aunque se hallaron pocos casos de deficiencia de vitamina A grave, fueron más comunes las deficiencias marginales. En los tres estudios se hicieron recomendaciones similares para hacer frente a las deficiencias detectadas en los diversos países. Es menester que los gobiernos y otras agencias sigan promoviendo la disponibilidad y el consumo de alimentos ricos en vitamina A y caroteno. Los programas contra la anemia deben dirigirse específicamente hacia los niños de 1 a 4 años de edad y las mujeres embarazadas.

REFERENCES

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2. Pan American Health Organization. *Health conditions in the Caribbean*. Washington, D.C.: PAHO; 1997.