Vitamin A deficiency in Latin America and the Caribbean: An overview[1]

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ABSTRACT

Vitamin A deficiency (VAD) has been known to exist in Latin America and the Caribbean since the mid-1960s; however, except for pioneering work by the Institute of Nutrition of Central America and Panama/Pan American Health Organization on sugar fortification in Central America, there was little interest in controlling it because of the low frequency of clinical findings. More recently, implications of the effect of subclinical VAD on child health and survival has generated increased interest in assessing the problem and a greater commitment to controlling it. The information available by mid-1997 on the magnitude of VAD in countries of the Region was extensively reviewed. Internationally accepted methods and cutoff points for prevalence estimations were used to compile information from relevant dietary, biochemical, and clinical studies carried out between 1985 and 1997 in samples of at least 100 individuals.

VAD in the Region of Latin America and the Caribbean is mostly subclinical. The national prevalence of subclinical VAD (serum retinol < 20 μg/dl) in children under 5 years of age ranges between 6% in Panama and 36% in El Salvador. The problem is severe in five countries, moderate in six, and mild in four. There are no recent data from Chile, Haiti, Paraguay, Uruguay, Venezuela, and the English-speaking Caribbean. The population affected amounts to about 14.5 million children under 5 years of age (25% of that age group). Schoolchildren and adult women may also have significant VAD.

Actions currently implemented to control VAD include (a) universal or targeted supplementation, with sustained high coverage rates through national immunization days in some countries; (b) sugar fortification, which is well established in El Salvador, Guatemala, and Honduras (a significant effect has been documented in Guatemala and Honduras) and is under negotiation in Bolivia, Colombia, Costa Rica (to be resumed), Ecuador, Nicaragua, and Peru; and (c) limited dietary diversification activities.

The functional consequences of vitamin A deficiency (VAD) for the individual, as well as the health, social, and economic implications for the population as a whole and for a country's social and economic development, have been well established (*1*). Severe and prolonged VAD is known to lead to eye lesions and, eventually, to irreversible blindness. However, given the size of the population affected and the cost to the health system in the face of scarce and dwindling resources, the consequences of subclinical VAD on function of the immune system and the risk of more severe and prolonged morbidity and increased mortality from infections are of far greater social and economic relevance (*2*). VAD is not only the single most important cause of childhood blindness in developing countries, it also contributes significantly, even at a subclinical level, to the high morbidity and mortality rates from common childhood infections (*3*). Through its interaction with iron metabolism, VAD may also be a significant contributor to the high rates of anemia observed in most countries (*4*).

In 1987, WHO estimated that VAD was endemic in 39 countries of the world (*5*). More recently, new evidence

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compiled by the WHO Micronutrient Deficiency Information System (MDIS) indicates that moderate to severe VAD, both clinical and subclinical, is a problem of public health significance in 60 countries, and it is likely to be a problem in at least 13 others. It is estimated that nearly 3 million preschoolers worldwide are clinically affected and 251 million more are subclinically deficient in vitamin A; thus their health and survival are at risk (*6*).

To assess the magnitude of the problem in the Region, published and unpublished reports on VAD in countries of Latin America and the Caribbean dating back to the mid-1980s were extensively reviewed. The reports were carefully scrutinized to ensure quality, reliability, and completeness of the data. Excluded from the review were reports of research studies aimed at development, adaptation, and field testing of assessment methodologies as well as surveys with a sample size of fewer than 100 subjects. This paper presents an overview of the vitamin A situation in the Region based on the results of the regional review, thus expanding and updating information presented in a 1997 PAHO report (*7*). A detailed report by country will be the subject of a separate publication.

BACKGROUND

In the late 1960s and early 1970s, the Interdepartmental Committee for National Defense of the United States conducted a series of nutritional surveys in the Region. Despite pitfalls in study design and methodology, the studies provided the first indication of the presence of multiple nutritional deficiencies, including VAD, in many countries of the Region.

In Central America the studies conducted jointly with the Institute of Nutrition of Central America and Panama (INCAP) identified energy-protein malnutrition, iron deficiency anemia, endemic goiter, and VAD as the most significant nutritional deficiencies in the subregion (*8*). VAD was then targeted as a priority, and some supplementation and dietary diversification activities were initiated. Efforts were made to develop appropriate technology for fortifying sugar with vitamin A. Relevant legislation was passed in the mid-1970s in Costa Rica, Guatemala, Honduras, and Panama, and implementation began in all but Panama; the practice was suspended in 1981 in Costa Rica and was implemented irregularly in Guatemala and Honduras.

In most countries of the Region, however, VAD was not considered a problem of public health significance because ocular lesions leading to permanent blindness were not frequently observed despite prevalences of low serum retinol hovering near the cutoff of 15% then recommended by WHO. Most recently, greater concern and political commitment have been triggered by research findings on the functional effects of subclinical VAD, particularly its impact on immunity and the risk of infectious morbidity and mortality (*9–11*). In the late 1980s and early 1990s, the problem received increased attention, which led to national assessments of dietary and biochemical VAD in a number of countries, including Belize, Bolivia, the Dominican Republic, Ecuador, El Salvador, Nicaragua, Panama, and, more recently, Colombia, Costa Rica, Guatemala, and Honduras.

REGIONAL SITUATION

Serum retinol

Low serum or plasma retinol concentration is widely recognized as a reliable indicator of the presence and magnitude of subclinical VAD in the population (*12*). The percentage of individuals with levels below selected cutoff points can be used to estimate the magnitude and severity of VAD as a public health problem. A greater than 10% prevalence of serum retinol levels <20 μg/dL (0.78 μmol/L) has been recommended by WHO as an indication that subclinical VAD is a problem of public health significance (*13*).

National surveys

The prevalence of serum retinol below the WHO recommended cutoff point in the Region varies widely from country to country, where nationally representative surveys have been carried out (Table 1). In 1991 in the Andean Subregion, Bolivia had an 11.3% prevalence rate among 891 children 12 to 71 months old in the poorest 30% of the population (*14*). In 1995 in Colombia the prevalence was 13.6% (*15*) among 12- to 59-month-old children, down from 24.0% in 1980 (*16*). Two surveys have been carried out in Ecuador: in 1986 low retinol levels were found in 14.1% of 1 600 preschool children (*17*) and in 17.6% of 1 232 12- to 59-month-old children in 1993 (*18*). However, the two samples are not strictly comparable, as the 1993 study targeted the five poorest provinces.

In Central America and the Spanish-speaking Caribbean, the highest prevalence of VAD (36%) was found in El Salvador in 1988, where it was higher in rural areas (41%) (*19*). In 1993 in Nicaragua the prevalence was 31% among children aged 12 to 60 months (*20*), and in the Dominican Republic it was 22.7% among preschoolers and 15% among schoolchildren (*21*). A national survey conducted in Guatemala in 1995 with a sample of 1 517 children found a prevalence of 15.8%; this was higher among children who consumed brown sugar (22.4%) than among those who consumed white sugar (15.1%), most of which is fortified (*22*). In Honduras, a 1996 survey found a 13.6% prevalence of VAD in preschool children (*23*). In Belize, 6.9% of children aged 2 to 8 years had low serum retinol, with a higher prevalence among the indigenous population in the south (*24*). The lowest prevalence for the subregion was found in 1981 in Panama, with 6.1% among preschool children nationwide, but it was 13% among indigenous children (*25*); a recent national survey in Costa Rica revealed a prevalence of 8.7% in 1996, up from 1.8% in 1981 (*26*).

A three-country study has recently been conducted in the English-speaking Caribbean (*27*) on β-carotene, vitamins A and E, and iron status. The cutoff point used in the report to consider marginally deficient vitamin A status was 25 μg/dL. The prevalence of serum retinol values <25 μg/dL was 11.7% in children 1 to 4 years of age in Antigua and Barbuda; 10.7%, 1.2%, and 2% in preschoolers, schoolchildren, and pregnant women, respectively, in Dominica; and 6.2%, 1.1%, and 2.5% in St. Vincent and the Grenadines for the same groups.

Subnational surveys

Five countries have had subnational surveys of importance, fulfilling the requirements mentioned above: Argentina, Brasil, Mexico, Peru, and Venezuela. In Argentina two studies were carried out by the Centro de Estudios sobre Nutrición Infantil (CESNI): in 1992 in Greater Buenos Aires (*28*) and in 1995 in Tierra del Fuego (*29*). The prevalence of low serum retinol is rather small among adolescents in the former (2.5%), and it ranges from 0.7% to 10.8% in all age groups in the latter.

Several subnational surveys have been conducted in Brazil. The most recent ones found a VAD prevalence of 49% among 2- to 8-year-olds in Sao Paulo (*30*), 45% and 28% in two groups of children between the ages of 4 and 14 years in Minas Gerais (*31*), around 22% among preschoolers and schoolchildren in Belo Horizonte (*32*), 60% of adults in Mato Grosso (*33*), and 15.8% in 326 children under 6 years of age in Paraiba (*34*).

In Mexico 29.5% of rural and 4.8% of urban children from diverse localities had low levels of retinol (*35*).

Several studies were carried out in different areas of Peru between 1990 and 1995. The prevalence of low retinol varied from <5% in urban Lima to almost 24% in the shantytowns (*pueblos jóvenes*) surrounding it (*36*), about 33% in Piura, and 14% in Puno (*37*). In the Inka and northern Marañon provinces it was approximately 64% and 76%, respectively, in children under 3 years old (*38*). In Libertadores it passed 21%

TABLE 1. Prevalence of serum retinol levels <20 μg/dL in Latin American and Caribbean countries

Country	Year	Size of sample	Group	Mean μg/dL	<20 μg/dL (%)
Antigua[a]	1996	94	1–4 years	—	11.7
Argentina	1992	386	Adolescents	34.3	2.5
Greater Buenos Aires	1995	1 313	All ages		10.8
Tierra del Fuego			Infants		8.7
			Preschool		1.7
			Adolescents		8.7
			Pregnant women		0.7
Bolivia	1991	891	12–71 months	32.3	11.3
Rural highlands					19.0
Eastern plains					17.0
La Paz					9.0
Brazil					
Sao Paulo	1986	285	2–8 years		49.0
Minas Gerais	1986	105	4–14 years		45.0
		107	4–14		28.0
Belo Horizonte	1987	130	Preschoolers		21.0
		120	Schoolchildren		22.0
Mato Grosso	1988	217	Adults		60.0
Paraiba	1988	5 426	0–6 years		15.8
Bahia	1989	400	3–7 years		54.7
Colombia	1995	2 187	12–59 months	—	13.6
Pacific Region					19.1
Atlantic Region					15.3
Costa Rica	1996	961	12–71 months	—	8.7
Dominica[a]	1995–1996	160	Preschoolers	—	10.7
		411	Schoolchildren		1.2
		151	Pregnant women		2.0
Dominican Republic	1993	1 516		27.6	
		765	Preschoolers		22.7
		751	Schoolchildren		15.0
Ecuador	1986	1 600	12–59 months	28.5	14.1
Rural					16.4
Urban					17.0
Five poorest provinces	1993	1 232	12–59 months	27.6	17.6
Rural					21.9
Urban					12.9
El Salvador	1988	720	<5 years	—	36.0
Rural					41.0
Urban					33.0
Guatemala	1995	1 517	12–59 months	15.8	15.8
Metropolitan					15.5
Highlands					16.1
Southeast					14.6
Northeast					16.2
Honduras	1996	1 752	12–59 months	—	13.6
Mexico	1993	489	Preschoolers	—	
Urban					4.8
Rural					29.5
Nicaragua	1993	1 755	12–60 months	24.0	31.0
Panama	1992	1 566	Preschoolers	37.4	6.1

TABLE 1. *(Continued)*

Country	Year	Size of sample	Group	Mean µg/dL	<20 µg/dL (%)
Peru				—	
Piura	1991	362	Preschoolers		32.8
Puno	1991	220	Preschoolers		14.1
Lima	1995	225	<3 years		
Urban					4.6
Slums					23.6
Libertadores/Wari	1995	168	<3 years		
Coast					72.8
Highlands					71.4
Inka	1995	57	<3 years		
Highlands					64.3
Jungle					75.9
Northeastern Marañon	1992	265	<3 years		
Coast					72.8
Highlands					71.4
Basic health and nutrition project	1996	1 861	<6 years	—	
Lima					22.0
Cuzco (Inka)					30.0
Piura (Grau)					49.7
Cajamarca					37.3
St. Vincent [a]	1996	176	Preschoolers	—	6.2
			Schoolchildren		1.1
			Pregnant women		2.5
Venezuela	1993	441	Preschoolers	—	6.7

[a] Cutoff point, 25 µg/dL.

in the coastal area and 24% in the highlands among children under 3 years old. A study in 1996, sponsored by the World Bank, of 1 861 children 6 to 71 months of age, showed a low retinol prevalence of 22% in Lima, 30% in Cuzco (Inka region), 50% in Piura (Grau region), and 37% in Cajamarca (eastern Marañon region). Among 946 women of reproductive age, the prevalence of low retinol varied from 2 to 9% (*39*).

In Venezuela, a recent study of preschoolers in a low-income community in Valencia reported a 6.7% prevalence of low serum retinol (*40*).

Vitamin A intake

There is scarce recent information on the intake of vitamin A according to population group. Most dietary surveys were conducted more than 10 years ago and do not indicate current consumption. In addition, there are well-known problems associated with estimation of preformed vitamin A from vegetable sources as well as problems related to data gathering. Simplified dietary surveys may provide useful information on the risk of VAD in population groups, as has been the case with the rapid dietary assessment methods developed by Helen Keller International (*41*) and the International Vitamin A Consultative Group (*42*), but they do not provide quantitative information on vitamin A intake by the population. The data available from dietary surveys in population groups indicate that intake of vitamin A is usually inadequate, although in most cases there is poor correlation with biochemical data.

Clinical signs of VAD

Except for data reported from hospitalized children in the Dominican Republic in 1991, the information available dates from the 1980s and cannot be taken as an indication of the present situation. Some studies in Bolivia and one in Brazil reported night blindness ranging from 0.2% to 5.0% (WHO cutoff, 1% (*43*)). Bitot's spots (WHO cutoff, 0.5%) were reported in one study in Brazil (0.6%) and two studies in Peru (1.6% and 3.0%), and other signs such as xerosis (WHO cutoff, 0.1%) and xerophthalmia-related corneal scars (WHO cutoff, 0.05%) were observed in Bolivia, Guatemala (Table 2), and the indigenous population of Panama.

DISCUSSION

Magnitude and trends of vitamin A deficiency

The most recent national surveys led to the conclusion that subclinical VAD is a national problem of public health significance (>10% prevalence of serum retinol <20 µg/dL), in decreasing order of magnitude, in El Salvador, Nicaragua, the Dominican Republic, Guatemala, Ecuador, Colombia, Honduras, and Bolivia (Table 3). Subnational evidence strongly suggests that VAD is also a significant national problem in Brazil, Mexico, and Peru; it appears to be confined to indigenous groups in Panama. On the other hand, ocular signs attributable to clinical VAD were extremely rare in the 1980s and they have not been assessed more recently.

A 1995 report from the WHO MDIS (*44*) estimates a regional VAD prevalence of 20% in preschool children. MDIS is a significant effort to keep track of the situation by country; it compiles mostly published data. The present review updates WHO information and includes unpublished but reliable and up-to-date data. National prevalence estimates were taken from national surveys in 11 countries and from subnational studies (average weighted by sample size) in five countries. The magnitude of VAD in the 16 countries with national estimates is severe in five, moderate in six, and mild in five (Table 4). There is no recent

TABLE 2. Clinical signs of vitamin A deficiency in Latin American and Caribbean countries[a]

Country	Year	Size of sample	Group	Night blindness (%)	Other (%)
Bolivia					
National	1981	5 745	6–59 months	1.1	—
Rural	1985	1 088	12–59 months	2.3	—
Iturralde	1986	1 969	<4 years	5.0	—
Inquisivi	1987	972	12–60 months	1.0	Corneal scars 0.1
Brazil					
Paraiba	1983	10 922	0–12 years	0.2	Bitot's spots 0.6 Xerosis 0.1
Paraiba	1988	5 426	0–6 years	—	Mild xerophthalmia 0.6
Dominican Republic					
St. Domingo/ Southwest	1991	840 hosp.	<5 years	—	Xerophthalmia 2.8 Xerosis 1.6
Guatemala					
Rural	1984	576	6 years	—	Xerosis 0.7
Chimaltenango	1986	1 369	<10 years		Xerophthalmia 0.5
Peru					
Puno	1983	1 674	All ages	—	Bitot's spots 1.6
Trujillo	1984	NR	All ages	—	Bitot's spots 3.0

[a] WHO cutoff prevalence about which clinical vitamin A deficiency is considered a problem of public health significance: night blindness, 1.0%; Bitot's spots, 0.5%; xerosis, 0.1%; xerophthalmia-related corneal scars, 0.05%.

TABLE 3. Estimated number of children <5 years of age with subclinical vitamin A deficiency (VAD), 1997

Country	Total population (millions)[a]	Population <5 years (thousand)	VAD prevalence (%)	Estimated no. of children affected (thousands)
Argentina	35.6	3 560	9[b]	320.4
Belize	0.2	20	7	1.4
Bolivia	7.8	1 170	11	128.7
Brazil	160.5	18 150	40[b]	7 260.0
Chile	14.6	1 606	3[c]	48.2
Colombia	37.4	4 114	14	576.0
Costa Rica	3.5	420	9	37.8
Dominican Republic	8.2	1 066	23	245.2
Ecuador	12.0	1 440	14	201.6
El Salvador	5.9	840	36	302.4
Guatemala	11.2	1 904	16	304.6
Honduras	5.8	928	14	129.9
Mexico	95.7	12 441	18[b]	2 239.4
Nicaragua	4.6	860	31	266.6
Panama	2.7	310	6	186.0
Paraguay	5.1	765	25[d]	191.3
Peru	24.4	3 172	30[b]	951.6
Venezuela	22.6	2 938	7[b]	205.7
Others	22.2	4 186	25[d]	1 046.5
Total	490.0	59 890	25[e]	14 643.3

[a] 1996 world population data sheet. Population Reference Bureau. Washington, DC, 1996.
[b] Estimated from subnational surveys.
[c] Estimated on the basis of other health/nutrition indicators.
[d] Estimated as 25%, the population weighed average for countries with national estimates.
[e] Population weighed average of the national estimates.

information from Chile, Cuba, Haiti, Paraguay, Uruguay, and the English-speaking Caribbean. Our prevalence estimate for the Region, expressed as the population weighted average of the national estimates, is about 25% (14.6 million children). The estimated regional prevalence is influenced by the contribution of large countries such as Brazil, Mexico, and Peru, whose prevalence was estimated from subnational rather than national surveys (Table 3).

Options to control vitamin A deficiency

Epidemiological studies have identified two major types of immediate causative factors for VAD: (a) deficient consumption of food sources of vitamin A, either preformed or as precursors of the vitamin (β-carotenes), coupled with low consumption of fats that facilitate their absorption; and (b) increased vitamin A requirements and poor utilization of the absorbed vitamin A because of infections, which are known to increase metabolic use and urinary excretion as well as to decrease absorption (*45, 46*). The relative contribution of each group of factors to the etiology of VAD differs by country and region. Current health and nutrition policies and programs address mainly the dietary causes—that is, those leading to deficient intake of the vitamin—and infectious morbidity is usually left to nonnutritional sectors (environmental sanitation, diarrheal disease control, immunizations, etc.).

An effective approach for controlling VAD should integrate short-term measures and medium and long-term actions. Short-term measures are universal or targeted supplementation aimed at young children and postpartum women, whereas medium to long-term actions include food-based approaches for increasing consumption of vitamin A from natural or fortified sources. In addition, other public health measures, such as those directed to reduce infections, have to be considered (*47*).

The relatively high coverage of primary health care services currently

TABLE 4. Countries categorized by degree of public health significance of subclinical vitamin A deficiency (VAD) (from information available as of December 1997)

Severe	Moderate	Mild	Insufficient information
Brazil	Bolivia	Argentina	English-speaking Caribbean
Dominican Republic	Colombia	Belize	Chile
El Salvador	Ecuador	Costa Rica	Cuba
Nicaragua	Guatemala	Panama	Haiti
Peru	Honduras	Venezuela	Paraguay
	Mexico		Uruguay

achieved in most Latin American and Caribbean countries compared with those of other regions allows for high coverage rates of vitamin A supplementation programs; however, only countries adopting a campaign approach—e.g., linking supplementation to immunization campaigns or health rallies—have consistently achieved high coverage rates. Nongovernmental organizations (NGOs) significantly contribute to expanding government coverage in the rural areas where public health sector coverage is spotty. Actual supplementation coverage varies among countries, frequently with fluctuations in each country as government commitment changes and supplies (mostly from UNICEF donations) are not permanent. Vitamin A supplementation is seen as a short-term measure, hardly sustainable in the long term, which may be implemented until other more sustainable interventions are in place or targeted to specific population groups at high risk of VAD that are not covered by other measures.

The importance of dietary diversification as a long-term strategy for improved consumption of food sources of vitamin A can never be overemphasized. The goal should be to increase vitamin A consumption to secure an adequate level with a safety margin to overcome seasonal variations. Ideally, individual intakes should be increased well above the minimum requirements conventionally established, so as to attain "nutritional insurance" levels to sustain an adequate store at all times. However, ensuring consumption of natural sources of the vitamin may prove difficult, given variations in supply, availability, and cost as well as cultural resistance to changing deeply rooted dietary habits.

Single or multiple fortification of staple foods must be considered whenever possible. Fortification of processed food items has greatly contributed to eliminating micronutrient deficiencies in industrialized countries. The efficacy of sugar fortification in improving vitamin A nutrition was proved two decades ago in Central America. INCAP (*Instituto de Nutrición de Centro América y Panamá*), a specialized center of PAHO, developed appropriate technology, promoted legislation, and demonstrated a significant impact on serum retinol levels (*48, 49*). The cost of fortification is normally transferred to the consumer because it represents less than 2% of the retail price of unfortified sugar. The cost to the government is usually limited to supervision and monitoring.

A cost-effectiveness analysis of vitamin A interventions in Guatemala in 1992 revealed that sugar fortification is by far the most cost-effective intervention, at $0.29 per person reached, $0.65 per high-risk person reached, and $0.98 per high-risk person-year of vitamin A adequacy achieved; the cost for supplementation and dietary diversification through home gardening/education is several times greater (*50*). In addition, for food fortification to be effective, there is usually no need to change dietary habits.

For infants, who are usually at lower risk of VAD than preschoolers, breastfeeding provides an adequate supply of vitamin A for the first 6 months of life and beyond. Its promotion should be among other strategies with marginal benefits to control VAD, as should disease prevention, helminth control, and other public health measures.

In summary, proven cost-effective interventions are readily available, which, if properly implemented on a sustainable basis and supported by strong political commitment, will contribute to virtually eliminating VAD in the Region.

Current programs for controlling vitamin A deficiency in the Region

A number of countries have formulated and are implementing plans to address several micronutrient deficiencies, including VAD when pertinent. Most of them have carried out, with variable degrees of population coverage, supplementation activities which have proved difficult to maintain and have tended to decline over time.

The successful Guatemalan experience encouraged other countries with significant VAD to foster fortification of sugar (or other food staples) as a key intervention. After initially sporadic implementation, Honduras formally resumed sugar fortification in 1992 and has made significant progress since then; coverage in the 1995–1996 harvest amounted to nearly 100% of the sugar for direct human consumption, and VAD rates have been significantly reduced from nearly 40% in 1966 to 14% in 1996 (*51*). Guatemala reported a significant decline as well; VAD prevalence in children dropped from 26% in 1988 to 16% in 1995 (*24*).

Other countries have initiated fortification or are in the process of doing so. In 1994, Venezuela began fortifying corn flour with vitamin A and other micronutrients. The same year El Salvador passed legislation on sugar fortification and began implementation in 1995. The governments of Bolivia, Colombia, the Dominican Republic, Ecuador, and Nicaragua are firmly committed to sugar fortification. A pilot program is being implemented in Bolivia, and pertinent legislation and negotiations with sugar producers are under way in Bolivia, Colombia, the Dominican Republic, Ecuador, and Nicaragua. Through a consensus-seeking negotiation process an effective public-private sector partnership is being built to contribute to prevention and control of VAD in these countries through sugar fortification. Other potential vehicles may be considered, such as margarine, vegetable oil, and wheat and corn flour. In 1995 the International Sugar Council (worldwide association of sugar producers) issued the Sao Paulo Declaration, formally recognizing the need to foster fortification of sugar with vitamin A in countries with a significant VAD problem.

Processed foods for infants as well as foods for wider consumption (cereals, powdered milk, dairy products, margarine, etc.) from leaders in the food industry are usually fortified with micronutrients, including vitamin A. Unfortunately, most of these products do not reach the population groups at greatest risk. Therefore, the emphasis has to be on fortification of one or more food staples (sugar, wheat or corn flour, rice, vegetable oil, etc.), complemented with other food-based interventions and supplement distribution as needed, in order to meet the existing consumption gaps leading to VAD.

Apparently less has been achieved in dietary diversification, as most activities have been on a small scale and have not been formally evaluated. Health authorities often find these activities difficult to manage, as they imply multidisciplinary work aimed at promoting production, marketing, preservation, and consumption of vitamin A-rich vegetables (carrots, yellow and orange fruits, spinach and other green leafy vegetables) through educational and social marketing strategies as well as promotion of family and community gardens, which are not within the scope of the health sector. NGOs are playing a critical role in dietary diversification through education and community development projects.

In summary, VAD is mostly subclinical in the Region, of severe magnitude in five countries, moderate in six, and mild in five; there is insufficient information from the English-speaking Caribbean and four other countries. VAD has been significantly reduced in Guatemala and Honduras (and possibly in El Salvador) through sugar fortification. Significant efforts are being made by a number of countries through universal or targeted vitamin A supplementation and relatively small-scale dietary diversification activities mostly implemented by NGOs. Close to the year 2000, VAD still affects nearly 15 million children under 5 years of age, or 25% of the preschool population of the Region, with significant morbidity and mortality implications. Given current programming efforts, a stronger commitment by most governments in Latin America and the Caribbean to accelerate implementation of integrated national programs encompassing proven intervention strategies, such as food fortification, supplementation, and dietary diversification, is required to come closer to the international goal established by both government and international agencies: virtual eradication of VAD by the end of the century.

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RESUMEN

La deficiencia de vitamina A en América Latina y el Caribe: un resumen

Se sabe que la deficiencia de vitamina A (DVA) ha existido en América Latina y el Caribe desde mediados de los años sesenta. No obstante, si se exceptúan algunas iniciativas tempranas del Instituto de Nutrición de Centro América y Panamá, había escaso interés en controlarla debido a la detección infrecuente de signos clínicos. En época más reciente, las consecuencias de la DVA para la salud y la supervivencia infantiles ha suscitado gran interés en evaluar el problema y despertado un mayor empeño por controlarlo. La información que estaba disponible a mediados de 1997 sobre la frecuencia de la DVA en países de la Región se revisó minuciosamente. Se aplicaron métodos y puntos de corte aceptados mundialmente para la estimación de la prevalencia a fin de recopilar infomación obtenida de estudios alimentarios, bioquímicos y clínicos efectuados entre 1985 y 1997 con muestras de 100 personas como mínimo.

La DVA en la Región de América Latina y el Caribe es eminentemente subclínica. La prevalencia nacional de la forma subclínica de DVA (retinol sérico < 20 µg/dL) en niños menores de 5 años oscila de 6% en Panamá a 36% en El Salvador. El problema es grave en cinco países, moderado en seis y leve en cuatro. No hay datos recientes para Chile, Haití, Paraguay, Uruguay, Venezuela y el Caribe de habla inglesa. En total la población afectada se aproxima a 14,5 millones de niños menores de 5 años (25% de ese grupo de edad). Los escolares y las mujeres en edad adulta también pueden tener una frecuencia elevada de DVA.

Las medidas que actualmente están en marcha para controlar la DVA incluyen, entre otras, a) la suplementación dirigida a toda la población o a grupos particulares, con elevadas tasas de cobertura logradas durante los días en que se efectúan las inmunizaciones de alcance nacional en algunos países; b) la fortificación del azúcar, que ya se ha instaurado en El Salvador, Guatemala y Honduras (se ha observado un efecto notable en Guatemala y Honduras) y que está en proceso de negociación en Bolivia, Colombia, Costa Rica (donde está pendiente de reestablecerse), Ecuador, Nicaragua y Perú; y c) algunas actividades de diversificación alimentaria.